THE NURSES
TEXT BOOK SERIES

THE JUNIOR NURSE

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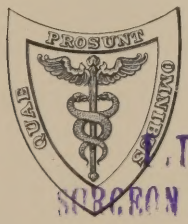

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TO

E. L. F.

AND

M. S. W.

PREFACE.

In the preparation of this volume the author has responded to a desire to supply the student nurse with a guide for the earlier months of her training. In all departments of education the advantage of carefully graded instruction is now universally accepted, and her years of experience in teaching have accordingly emphasized in the author's mind the need for a suitable primary text-book. Hence, clearness and simplicity have been her aim.

For example, the subject of bacteria is confined to a short but practical chapter in which is given information as to their growth, various products, and wide distribution, together with accepted methods for their destruction. Again, though a discussion of the chemistry of foods and the unsettled subjects of digestion, assimilation, and metabolism is avoided, a simple classification of diets and their special application to various disease conditions and the process of repair are given.

The clinical features are emphasized throughout. Instruction in observing and recording the patient's condition is simply but carefully outlined; and the methods of treatment, including surgical dressings, in which the nurse is expected to assist, are fully described and explained.

In brief, the object of this volume is to provide the student with a complete text covering those topics which naturally belong to her junior course, and at the same time to withhold the more intricate studies which she will better comprehend during her senior year.

A full glossary is conveniently placed at the end of the book.

C. A. B.

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THE JUNIOR NURSE.

CHAPTER I.

QUALIFICATIONS.

Physical, Mental, and Moral Qualifications of the Nurse—The Ethical Relation of the Nurse to the Patients and Their Friends —To Her Superior Officers—Hospital Staff—Fellow-workers—Her Duty to Herself.

THE development of sick-nursing has brought into existence a large, highly skilled, and organized profession. It is one of the most notable features of modern, social life.

Women whose ambition it is to enter this profession should consider their personal qualifications. The desire to be a nurse, and the willingness to submit to strict discipline and perform hard work, while of utmost importance, is not all that is necessary.

There must always be an element of self-sacrifice, effacement, and an appreciation of the seriousness of the work. There is no class of persons who come so close to the tragedies of life as does the nurse, consequently she should be a woman of sterling qualities.

The qualifications are good health, both physical and moral, and a well-trained mind.

Physical efficiency consists of being free from all organic diseases, all infirmities, peculiarities, and defects (including enlarged glands, tonsils or adenoids, defective teeth, and feet weakened or broken down); the candidate should be in possession of faultless sight and hearing, and sufficient strength and endurance to make the best use of her possessions.

The mental qualifications are intelligence, common-sense, perception, adaptability, discernment, executive ability, cheerfulness, and tact. The last is a rare asset, and has been defined as "not the quality by which you please but by which you seldom offend."

A certain amount of education and mental training is indispensable. This does not necessarily mean a high degree of education, though that is always to be desired, as it is true that the educated woman, who has the power of application, finds in her work much more that is of interest, and is able to perform it better, more easily, and more understandingly than the woman whose mind is untrained.

Mental training is that training received in school, home life, or business which enables one to think for one's self; to be discreet; to possess judgment; to be able to observe and study intelligently; to know, instinctively, the right thing to do, or the right decision to make; to know how to receive merited criticism and profit by it.

The moral qualifications are those of any God-fearing, self-respecting woman.

Ethics is that branch of philosophy which deals with human character and conduct so far as they depend

upon certain general principles, which include the conception of duty, honor, loyalty, truth, responsibility, and justice.

The Ethical Relation of the Nurse to the Patients and Their Friends.—To the patients she should be a faithful, devoted, and tireless servitor. She should be willing to give to them the best she has to give, regardless of color, creed, or social standing. She should forgive their ignorance and forget their faults, remembering only that they are human beings, and that they are helpless and ill.

To their friends she should ever be courteous and considerate, helping them when possible, and in every way try to make their burdens lighter.

Superior Officers.—To her superior officers she owes deference and loyalty in the fullest sense of the terms, and an obedience that is prompt, unquestioned, and absolute.

Her relations with the hospital staff should be purely professional. To them she owes allegiance, and she must remember that her profession supplements that of medicine; that her part is to help, and not to criticise nor suggest.

To her fellow-workers she should be at all times courteous, helpful, without being officious, and should respect their privileges and pleasures.

A Nurse's Duty to Herself.—The necessity for perfect health is obvious, consequently the fundamental rules of hygiene must be observed, including proper food, rest, sleep, fresh air, and outdoor exercise and recreation which should never mean strenuous effort.

She should cultivate or develop any talent she may possess, which is not only a diversion but may also serve as a recreation, for it has been truly said that "rest is not in cessation from work but in change of work."

She should keep up a general interest in the things which are happening in the world, and not allow herself to become self-centred, dull, or uninteresting—in fact, she must at all times be true to herself.

CHAPTER II.

PERSONAL HYGIENE.

Food and Drink—Clothing—Care of the Feet and Hands—Bathing—Exercise—Recreation—Sleep.

Hygiene is the science of preserving health. On the personal or individual side it involves the consideration of the character of the food, water and other beverages; of clothing; of work, exercise and sleep; of personal cleanliness; of special habits, such as the use of alcohol, drugs, etc.; and the control of various passions.

Since an important factor in the efficiency of a nurse is her health, it follows that everything which may in any way influence this should be looked after with the greatest care. It is unreasonable to expect the same amount and quality of work and power of endurance in the girl of eighteen or twenty years as in the fully matured woman; also, the young are more susceptible to infections of all kinds. As a rule, the city-bred woman is better able to stand the confinement, close application, and hard work than the country-bred girl, who is, more or less, accustomed to outdoor life and freedom, the deprivation of which

is very trying, and in some cases may entirely disqualify her for hospital work.

The ideal nurse is the one who can resist influences which may depress mentally or physically, and who has the power to endure fatigue.

After entering the training school, much of the individuality and independence of the young woman is lost.

Her living conditions, food, clothing, to a certain extent; hours for work, sleep, and recreation are fixed for her without her individual preference.

Food.—For people who are in good health there are two rules which should be observed in regard to their food. One is to choose the varieties which "agree" with them and avoid those which they cannot digest and assimilate without harm, and the other is to use only such foods and in such quantities as will afford sufficient nourishment and maintain the normal body energy and weight.

Drink.—It has been estimated that about eighty ounces of fluid should be taken during the twenty-four hours by the average adult person. A considerable portion of this should be taken as food. Water forms the principal part of the blood; it holds in solution and distributes the products of digestion, and is the medium by which waste material is carried from the body. It is a well-known fact that most people take too little fluid, and this is especially true of women.

Coffee should be used in moderate amounts, and

when properly taken is probably of benefit to the adult. It contains an alkaloid, caffein, which acts as a mild stimulant without producing disagreeable after-effects; also, it does not incapacitate one for labor. It diminishes tissue waste and gives a feeling of rest after exhausting mental or physical effort. For this reason, and because it permits the performance of excessive labor upon a limited diet, it is often taken in excess. When tolerance has been established, or a habit formed, coffee is no longer of value, but instead may become decidedly harmful.

Tea has much the same effect as coffee, with the exception that coffee contains considerable nourishment.

Clothing.—The objects of clothing are to protect the body from the sun's rays, from the cold, and from winds; from the rain and other forms of wet, and from mechanical, external injuries and discomforts; to conserve body heat and prevent interference with the natural functions of the skin.

In discussing the value of different materials for clothing, the two important factors to be considered are their power of conducting heat and absorbing moisture.

The heat-conducting power of a garment does not wholly depend upon the material itself, but upon its texture. The looser the texture of a fabric, the greater the amount of air is held in its meshes.

Dry air is a poor conductor of heat, consequently a loosely woven garment will feel warmer.

Wool, for the reason that it is usually woven into a cloth that is loose and porous, is a most valuable material for cold weather.

Cotton material, usually compact and non-porous, is not so valuable as wool in cold weather. However, when especially manufactured so that its texture resembles that of woolen cloth, it is a fair substitute for wool.

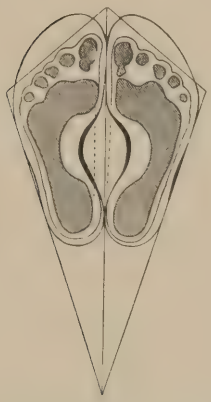
Next to the texture of a material in importance is its color and its power to absorb or reflect the sun's rays. The heat of the sun's rays is absorbed to the greatest extent by black, then in order the dark shades of blue, green, and red. Heat is reflected most by white, then the light shades of yellow, green, and blue.

In underclothing which is not exposed to the rays of the sun, the color is unimportant. Underclothing should be changed frequently (daily if possible). It should, at least, be thoroughly aired overnight, and the same set should never be worn day and night.

Damp underclothes favor the development of certain parasitic skin diseases, the organisms of which can live only in conditions where heat and moisture are afforded.

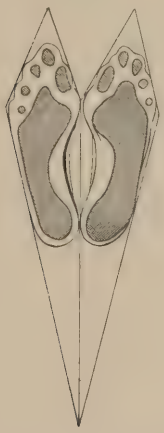
Care of the Feet.—There is no part of the body more generally overworked and abused than the feet. The shoes should fit perfectly, yet they seldom do. In a well-made pair of shoes the inner sides should be nearly parallel and not diverge greatly when the

FIG. 1



Proper soles for normal feet. (Whitman.)

FIG. 2



Shoemakers' feet. (Whitman.)

wearer stands with the feet together. The outer side of the shoe should have a curve inward, and the toe should in no case be pointed. The greatest amount of comfort may be obtained from the low shoe, which neither interferes with the free action of the ankle nor constricts circulation. The heels should be low and broad. High heels are not worn for comfort in walking, but to diminish the apparent length of the foot. For purpose of successful deception they take about equal rank with hair dyes and artificial complexions.

Personal Cleanliness.—Personal cleanliness is essential to health and comfort. Daily bathing is necessary because it removes dirt and infectious material of external origin, and is a means of keeping the skin free from the waste products which interfere with its proper function.

For persons in good health a daily cold bath is advisable. A full tub bath is best, and should be taken in the morning. A shower bath or sponging with cold water is a good substitute, and may be borne by many who cannot endure the shock of immersion. The effect is essentially a stimulant, and increases the activity of all the organs. The respirations are at first gasping, then slowed and increased in depth, the pulse is diminished, and the temperature slightly lowered. The nervous system and mental faculties are stimulated. Upon emerging from the bath the skin should be dried with a coarse towel; the body should be pink and warm, rather than cold.

One of the benefits derived from cold bathing is the immunity from catching cold.

Hot bathing is a grateful means of reducing the lameness of muscles after hard work or violent exercise. They are depressing, and while of value in conditions of insomnia, should only be taken by the advice of a physician.

Persons who are not in good physical condition should avoid extremes, the best results being obtained when the water is at the temperature of the body.

For purposes of cleanliness the cold bath should be supplemented by the use of warm water, soap, and a brush, which are effectual means for removing the dirt and effete material from the surface of the body.

Care of the Hands.—Especially should careful attention be given the hands, not only to keep them immaculate, but in good condition by the use of lotions, cold cream, etc. This is particularly necessary for nurses, as most of the infections from which they suffer are due to carelessness in the care of the hands.

Exercise.—In the majority of individuals all the exercise needed is taken as an inseparable element in their regular work, and any additional amount should be performed as a recreation.

Violent exertions do harm when a person overworks the heart (gets "out of breath"); it should be regarded as a danger signal, and absolute rest should be enjoined.

Outdoor exercise when possible is the best. There are few people who have not the power to walk, and walking is an excellent form of exercise; at the same

time it furnishes a means of recreation, and is a luxury all can afford.

Sleep.—The amount of sleep required depends upon the physical effort expended; the diet, to a certain extent, and upon the age and general condition of the individual. The average adult requires about eight hours of complete repose.

CHAPTER III.

BED MAKING.

Economy of Time, Labor, and Hospital Property—Making a Bed with the Patient In—Changing Linen, etc.—Fracture Bed—Cradles —Head-rests—Moving and Lifting Patients.

In making a bed there are three things to be considered: (1) The comfort of the patient; (2) the economy of time, labor, and utensils; (3) its beauty or symmetry.

The comfort of the patient consists in having an absolutely smooth surface on which to lie, free from humps in the mattress and wrinkles in the sheets; the blankets put on to cover the patient, not tucked under the mattress so tightly that it is impossible for the patient to turn over or draw up the feet; the pillows adjusted to suit the occupant and the existing conditions.

Pillows which may be very comfortable under some conditions may be decidedly uncomfortable at other times.

Economy of time and labor consists in gathering the necessary clean linen to make the required number of beds. Considerable time is lost by the failure to do this. Place a chair at the foot of the bed, remove from the bed each article separately, and fold it over the chair; thus the nurse is able to get the required sheet or

blanket from either side of the bed, saving many steps and considerable time. Economy of linen means its proper adjustment. A sheet carefully and tightly put on the bed or a spread or pillow case adjusted without crushing remains fresh much longer.

That the ward may present an orderly appearance, it is often necessary to change linen which is only *badly crushed.*

To make an empty bed, remove separately each article of clothing and fold over a chair at the foot of the bed. Turn the mattress from head to foot, that the heavy part of the body may not always come in the same place. Adjust the under sheet by tucking it well under the mattress at the head of the bed, allowing about twelve inches for this; then standing at the foot, pull the sheet tightly and, raising the mattress, draw it over the end; when it is lowered the sheet will be stretched on as tightly as it is possible to make it. Fold back the corners and tuck under the mattress, the ends first, the centre last.

The rubber sheet is put on cross-wise over the centre of the bed. The draw sheet is to entirely cover the rubber with two thicknesses, or a large sheet may be folded and used. In either case the upper edge should come well up under the pillow.

The upper sheet should be put on so that the smooth side of the hem comes on the outside when turned down over the blanket. Each blanket is put on separately, the sheet turned down at the top, and tucked in all together, in the order of the under sheet.

It is possible to adjust the spread in so many

different ways that a description is difficult. It should be borne in mind that a spread is not for the purpose of hiding a poorly made bed, which it never can do.

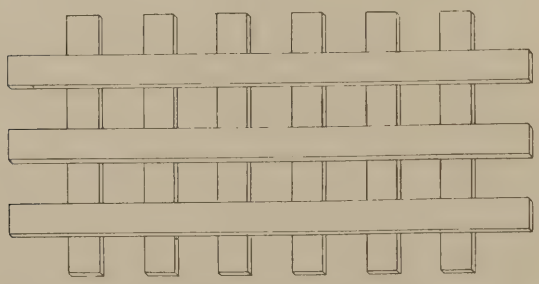
Pillow cases should be carefully put on so as not to crush; the corners should be well filled out, with the seams toward the head of the bed. With both hands in the centre, press the pillows down so that they will lie flat.

To Make Bed with a Patient In.—Remove all the upper clothing except one blanket, which is to remain over the patient. If not uncomfortable, the pillows may also be removed, otherwise they are moved with the patient to either side of the bed. Standing at the foot of the bed, pull the upper sheet from under the blanket. Loosen the bottom sheets and turn the patient on the side, having him lie near the edge of the mattress. If the patient needs help in turning, he should always be turned toward the nurse, then there is no possibility of him being rolled out of bed. The draw sheet, rubber and bottom sheet are then folded close up to the patient's back; a fresh bottom sheet put on that part of the mattress which has been uncovered and the ends and outer edge tucked under the mattress, the free edge rolled, or folded close beside the soiled linen. The rubber may then be pulled back, covering the fresh sheet; then the draw sheets are put on, the outer edge being tucked in.

Before going to the opposite side, turn the patient, drawing the pillows to that side. The soiled linen may then be removed and the fresh drawn through and tucked in. Care must be taken that there are no

wrinkles in sheets or rubber, and that they are so securely tucked in that they will not work loose after

FIG. 3

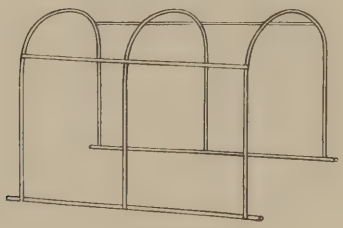


Fracture board made from one-half inch pine, painted white, size of bed.

a few hours. Replace pillows and make the patient comfortable; then proceed as in an empty bed.

A fracture bed differs from a regular bed only in that a so-called fracture board is placed between mattress

FIG. 4



Bed cradle.

and springs, making a uniform unyielding surface. A cradle may be put over the feet to keep off the weight of the bedclothes.

Head rests are used for convalescents and patients who have difficult breathing from any cause, or for some reason are more comfortable in a reclining position.

The head-rest is not comfortable for all persons. When used, it is best adjusted under the mattress, the whole being covered with a sheet tucked in.

Three pillows are necessary: the first two placed one above the other, and the third to stand on end, should be pulled low down under the back.

FIG. 5

To Change Position of Patient.—The necessity for changing the position of patients increases with their degree of helplessness, not only as a means of adding to their comfort, but to guard against bed-sores.

To turn those who are able to be of slight assistance, the nurse should stand close to the side of the bed, with one hand under the shoulder and the other under the hip of the opposite side, and the patient is turned

toward the *nurse*. By this method it is impossible to roll a patient out of bed.

One nurse should never attempt to move an absolutely helpless patient alone. It is best done by two nurses standing at opposite sides of the bed, and by holding the sides of the sheet, lift him to any part of the bed or to a different one if necessary.

It also requires two nurses to make the bed: one to turn the patient and prevent him from falling out, and the second to adjust the bedclothing.

CHAPTER IV.

ADMISSION OF PATIENTS.

Listing and Care of Clothing and Valuables—Bathing—Washing the Hair.

In many hospitals patients are admitted to a receiving ward, where, when not too sick, they are undressed, bathed, and their clothing and valuables listed and cared for. When no receiving-room is provided they are admitted directly to the ward.

Whatever the arrangement may be, the patient should receive immediate attention and be made as comfortable as possible, both mentally and physically.

All patients should be given a kindly, sympathetic welcome. This is usually appreciated and helps reassure them in spite of former fears and prejudice. It is particularly true of non-English speaking people and of children.

If seriously ill, the patient should be laid on the bed before undressing. The clothing, no matter what its condition, should be removed carefully.

When there is injury to either leg or arm, the garments should be removed from the well side first. If badly scalded or burned, the clothing should be cut off.

The undressing of patients should be done by two persons, and duplicate lists made of all articles, including contents of the pockets, valuables etc.

WOMEN'S CLOTHING LIST.

Name, _____

Date, _____ Ward, _____

N. B. The Head Nurse will make out this list immediately on the entry of every patient, and send it promptly to the Supervisor's Office. After being entered there, it will be returned and kept with the clothing. When the patient is discharged the Nurse must verify the clothing with the list, and return it to the Supervisor, with the patient, when she leaves the ward.

Bonnets, _____
Hats _____
Boots, _____
Shoes, _____
Slippers, _____
Stockings, _____
Dresses, _____
Skirts, _____
Waists, _____
Flannel Skirts, _____
Drawers: Cotton, _____ Flannel, _____
Corsets, _____
Chemises, _____
Nightgowns, _____
Aprons, _____
Towels, _____
Handkerchiefs, _____
Shawls, _____
Cloaks, _____
Gloves, _____
Sacks, _____
Collars, _____
Cuffs, _____
Neckties, _____
Valises, _____
Valuables, _____
_____
_____
_____

_____ Head Nurse.

Entered in "Entry Book" this day.

_____ 191

_____

Supervisor.

Date of Discharge, _____ 191

I have carefully compared the clothing with this list and find the articles all accounted for[1]

_____

Head Nurse.

[1] Except.

These lists should be signed by the head nurse and *by the patient,* who is allowed to keep one, and the other is kept with the clothes.

All clothing should be examined carefully for pediculi, and, if necessary, fumigated. Articles returned after being fumigated which are soiled should be marked with the patient's name, ward, and bed number, and duplicate lists made and sent to the laundry, one list to go with the soiled articles, the other to be kept in the ward.

Valuables should be sent to the hospital safe, kept for that purpose. Money, papers, jewelry, etc., should be put in an envelope and sealed, and a list of the contents, with the patient's name and ward, written on the outside.

The temperature, pulse, and respiration should be taken. If the temperature is not above 99° F. and the pulse is of good quality, the patient may be taken to the bath-room for a tub bath if there is no special reason for not doing so. A person with skin disease or a rash would be excepted. Patients should not be allowed to take a bath unattended by a nurse; after the bath they should be given a bath-robe and slippers, or be put in blankets and taken to bed in a wheel chair.

When preparing to give a bath in bed, there should be at the bedside hot water, plenty of towels, wash cloth, soap, brush, nail file, scissors, orange stick, and combs, both coarse and fine. If the patient has no tooth-brush one should be provided, or swab sticks with small pieces of gauze or listerine or any suitable mouth wash may be used to clean the mouth.

The bed should be protected with a rubber, covered

with a blanket, the bedclothes neatly folded down to the foot of the bed, and the patient covered with a warm wool blanket (never a cotton blanket or sheet).

The face and neck should be bathed first, then the rest of the body in sections, keeping all the body covered warmly except the part being bathed.

Special attention must be given to the nails, and the hairy portions of the body should be examined for pediculi. If there are pediculi the hair should be saturated with tincture of larkspur and securely pinned up in a towel before the bath is commenced. Later the hair should be combed with a fine comb and thoroughly washed. Several applications of larkspur, followed by the use of a fine comb, may be necessary before washing.

Ether or hot vinegar may be used to remove nits, but many applications may be required.

To wash the head of a patient in bed, the pillow should be covered with a rubber and a rubber sheet placed about the neck, with the sides folded over to form a drain, and the end dropped in a pail or slop jar at the head of the bed. Two pitchers are necessary, one containing warm, soapy water, and the other clear, warm water for rinsing.

The soapy water should be poured over the hair and the scalp, thoroughly scrubbed until it is clean, and then rinsed with clear, warm water. The head and hair should be dried as much as possible with towels, the tangles combed out, and the hair spread over the pillow to dry.

It is not always possible to wash the hair of a female patient when the entrance bath is given, as the procedure is tiresome for the patient who is seriously ill.

CHAPTER V.

TEMPERATURE, PULSE, AND RESPIRATION.

Heat Production and Elimination—The Normal Temperature—The Pulse, Abnormal and Normal—Respiration, Types, and Characteristics—Clinical Thermometers and Charts.

BODY TEMPERATURE.

All warm-blooded animals have a temperature nearly constant, regardless of the climate in which they live.

This is called the "normal temperature," and is compatible with health.

It is the balance between heat production and heat elimination.

Heat is produced in the body by oxidation of the food which has, in whole or in part, become a part of the body.

The oxygen which is breathed into the lungs eventually combining with substances in the body produces combustion, the result of which is heat.

Some of this heat is utilized as energy and some given off in the expired air. About 88 per cent. of the entire amount lost is from the surface of the body by radiation and the evaporation of the moisture from the sweat glands; a small amount is lost through the excretions. The balance is retained to furnish the

body heat, which, with very slight variations, is constant.

Increased activity results in an overproduction of heat which in health is given off through the increased amount of moisture on the surface of the body and the expired air by more rapid breathing. By this means the balance is maintained, which is 98.6° F. or 37° C. Deviation from this is serious in proportion to the degree of abnormality.

Any rise in the temperature of the body is caused by increased oxidation. At the same time there may be an increase in the amount of heat lost, but not in proportion to the overproduction, so the balance is lost. Heat is then stored up in the body, which condition is spoken of as fever, or pyrexia.

This fever may be generated within the body, the result of waste not properly eliminated, or it may be produced by poison taken in. This is usually in the form of bacteria.

All infections, to a greater or lesser degree, are accompanied by fever.

Subnormal temperature, or a temperature below normal, is more often due to the low production of heat than to its excessive loss, as is the case in starvation, shock, or collapse, and after wasting diseases. In hemorrhage, excessive vomiting, diarrhea, and exposure to cold the low temperature is caused by the direct loss of heat.

A certain amount of heat is necessary to life. Any diminution shows a low vitality. If greatly diminished, death will result.

The degree of abnormality is second in importance to its duration.

The human body can stand a greater increase than decrease in temperature.

One may recover from an illness in which the temperature has ranged 3° or 4° above normal for weeks; while a temperature 3° or 4° below, results fatally in a few hours.

The degree of temperature compatible with life depends considerably upon the cause of abnormality.

Patients may recover from sunstroke after a temperature of 108° or 110°. This excessive degree lasts only a few hours.

In pneumonia, which is a disease of short duration, the temperature frequently reaches 105°, and recovery follows.

In malaria 106° is not uncommon, while such a degree prolonged, as in typhoid, would undoubtedly be fatal.

Patients have recovered from shock with a temperature of 95° and died of a prolonged temperature of 97°, as in starvation or cancer of the stomach.

THE CLASSIFICATION OF BODY TEMPERATURE.

Hyperpyrexia,	105° F. or over
Pyrexia (fever),	101° F. to 105°
Subfebrile,	99° F. to 101°
Normal,	98° F. to 99°
Subnormal,	97° F. to 95°
Collapse,	95° F. or below

It is customary to take the temperature at least twice daily. This should be done at the same hour every day in order that an exact record may be made.

In severe cases it is recorded every four hours or oftener. In this way any sudden rise or fall is noted which otherwise may have been overlooked. It is also necessary in carrying out antipyretic treatment.

Records are made on clinical charts by drawing lines up and down according to the degree of temperature.

The records are valuable, as they afford a clinical picture of the course of the disease.

As each disease has individual characteristics and runs a certain course, an accurate record is of importance.

A clinical thermometer is the instrument used to take the temperature of the body.

It differs from all others in that it does not record changes in the temperature of the atmosphere, but is self-registering.

For convenience the temperature is usually taken by the mouth. The bulb of the thermometer is placed under the tongue, the lips closed, and the patient told to breathe through the nose.

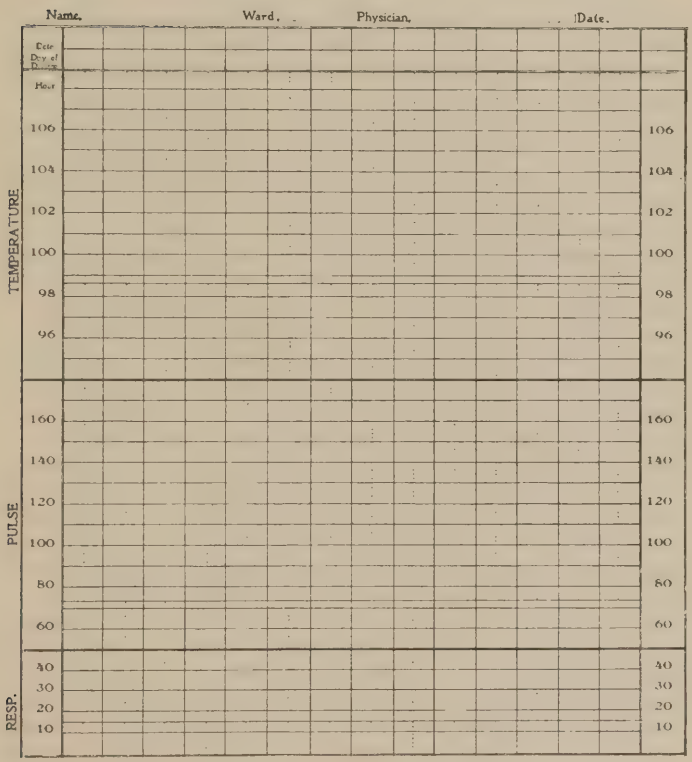
When it is impossible to do so, because of any malformation or temporary obstruction of the nasal cavities and the patient breathes through the mouth, an accurate record cannot be made. In such cases it is best to take the temperature in the axilla or rectum. (The vagina or groin may be used.)

When taken by the axilla the record is about $\frac{4}{10}$° F. lower than when taken by the mouth and $\frac{4}{10}$° F. higher

by the rectum than by the mouth. When a change is made from the mouth to axillary or rectal temperature

FIG. 6

TEMPERATURE CHART.



the first record should be marked A (axillary) or R (rectal), as the case may be.

The axilla should be wiped dry, care being taken that two surfaces of the skin come together, covering the bulb completely. The arm should be held to the body tightly.

When taken by the rectum it must be empty, as otherwise no record will be made.

A nurse should never leave a patient who is having the temperature taken by the rectum. The thermometer may get lost in the rectum or be broken off. Either accident would be decidedly serious.

An ordinary hospital thermometer will record in three minutes by the mouth or in six by the axilla or rectum.

The minute thermometer also takes twice as long by the axilla or the rectum.

A young child or an unconscious, delirious, or insane patient should not have a thermometer put in the mouth, because they are liable to break it between the teeth, and there is the possibility of swallowing pieces of glass or the mercury.

When not in use, thermometers should stand in a jar or mug kept for that purpose, in which there is some disinfectant solution or 70 per cent. alcohol.

A layer of absorbent cotton may be put in the bottom of the jar to prevent breaking the thermometer, but should be changed each time the thermometers are used.

The mercury should always stand as low as 96° F. before taking the temperature of any patient. This is accomplished by grasping the end firmly and shaking it down.

THE PULSE.

The pulse is the expansion and recoil of the arteries caused by the contraction of the heart. By this contraction the blood from the left ventricle is forced into vessels which are already full; this causes distention, which may be felt in any of the superficial arteries, and is called a pulse wave.

This furnishes an index to the heart's action: whether it be strong or weak, rapid or slow, regular or irregular.

The normal pulse is regular both in strength of beat and rhythm; it should beat from 70 to 80 times per minute, and there should be a medium artery, neither distended greatly nor very compressible.

The pulse is slower in man than in woman. In young children (three or four years) it may be 100, in newborn babies 120 to 130. This gradually decreases until adult age, when the average pulse rate is about 72.

In extreme old age it becomes much slower than normal, sometimes reaching 50 or 60.

The normal pulse is subject to considerable variation as to the number of beats per minute. It is greatly influenced by exercise; the more violent, the more rapid the pulse; excitement, emotion, and digestion all affect the pulse, increasing the rate somewhat.

The abnormal pulse differs from the normal in many ways. The types directly due to the heart's action are: (1) Irregular pulse—may be irregular in strength of beat or in rhythm. (2) Intermittent pulse—where a beat is occasionally lost. (3) Frequency—slow or rapid.

While these conditions may exist in a diseased heart they do not necessarily mean organic trouble; it may be purely functional, denoting weakness.

Any of the above abnormalities may exist after a long illness, particularly after typhoid, or where there has been a considerable wasting of tissues.

Types due to the condition of the bloodvessels are:

Dicrotic pulse is caused by the relaxation of the arterial walls. Two beats are felt. A strong beat or pulse wave, followed by a weaker one, for each contraction of the heart.

The first wave is caused by the contraction of the ventricle and the secondary, or smaller wave, by the closure of the aortic valve. It may be distinguished from an irregular pulse by counting the heart beat for the same length of time.

A high-tension pulse, or one in which the arteries seem distended and non-compressible, is usually due to the contraction of the small vessels, arterioles, and capillaries.

A low-tension pulse, the exact opposite, may denote a weak heart, but more frequently relaxed capillaries.

Pulse may be felt at any superficial artery. For convenience the radial artery (at the wrist) is the one most often used. If the heart's action be weak it may be felt more plainly at the carotid or temporal arteries.

It is possible to make an accurate count in one-half minute, but it is not possible to determine the character of the pulse in that time, consequently, it should be held long enough to discover any abnor-

mality if there be one. *The character of the pulse is most important.*

In counting the pulse, the first two or three fingers should be held on the artery, never the thumb. The pulsations in one's thumb may often be felt and confused with that of the patient.

RESPIRATION.

Respiration is the function by which oxygen is absorbed into the blood and carbonic acid exhaled. The assimilation of oxygen and the evolution of carbonic acid takes place in the tissues as a part of the general process of nutrition.

The respiratory movements are two, and consist of an alternate dilatation (inspiration) and contraction of the chest (expiration). Both are mechanical, muscular movements, and while involuntary they may be modified to a certain extent.

Inspiration, taking in of oxygen, is due to the contraction of the respiratory muscle causing dilatation of the chest. The air then rushes in to fill the space thus created.

Expiration is partially a passive process, and is the result of the recoil of the walls of the thorax, and of the elastic tissues of the lungs, whereby the carbonic acid is expelled.

The respiratory movements vary according to age, sleep, and exercise, being most frequent in early life.

The number is increased by exercise and decreased by sleep.

The ratio to the pulse is about 1 to 4 in health, and in the normal adult the average is about twenty respiratory movements per minute.

Normal respirations should be quiet, easy, and regular.

The types vary according to age and sex.

The abdominal type is most marked in children, irrespective of sex, the movements being effected by the diaphragm and abdominal muscles.

The superior costal type in the adult female: The movements are more marked in the upper part of the chest, from the first to the seventh ribs, permitting the uterus to ascend into the abdomen during pregnancy without interfering with respiration.

The inferior costal type is manifested by the adult male; the movements are largely produced by the muscles of the lower part of the chest and by the diaphragm.

In disease the respiration varies according to existing conditions.

In pneumonia the respirations are rapid, difficult, painful, and shallow: Rapid and difficult because of diminished air space. Painful and shallow because of the inflammatory process.

Rapid heart action also causes difficult or labored breathing, an increased amount of blood being sent to the lungs for its supply of oxygen; nature labors to supply that demand.

Difficult or labored breathing from any cause is called dyspnea. Accompanying this is usually a dusky or blue color of the skin called cyanosis; this is due to the insufficient amount of oxygen absorbed.

An upright position, with the support of bedrests and pillows, is necessary in conditions of this kind.

Stertorous breathing is that in which a snoring sound is produced.

It usually accompanies unconsciousness from any cause; it may occur during sleep; the unconsciousness is produced by an anesthetic or some cerebral condition. In the latter case it is a serious symptom. The greater the degree of unconsciousness the more marked and louder will be the snoring.

The Cheyne-Stokes respiration is a type in which there is an irregularity which occurs with almost perfect rhythm.

It may occasionally occur in elderly persons, particularly when asleep. When associated with disease it is a grave symptom.

It is most likely to occur in diseases or conditions of the brain, occurs less frequently in those of the heart and kidneys, and is usually considered a premonition of the end.

In Cheyne-Stokes breathing there will be a very quiet, shallow respiration, the chest movement being almost imperceptible. Each successive breath becomes deeper, more audible, and the respiratory movements more pronounced, until it results in a deep snoring respiration.

Then it decreases by the same stages until it finally stops for an interval varying from five to thirty seconds, when it is repeated.

As the respiration increases in intensity the interval between breaths usually decreases in proportion.

Edematous breathing is the result of fluid in the air passages. It is difficult, and produces a loud, rattling noise as the air passes in and out. It is always accompanied by considerable cyanosis, and is a serious condition.

Usually little can be done to relieve the condition, and death results.

When counting respirations the action of both sides of the chest should be noted: if it be symmetrical or otherwise; also the frequency, ease, and depth of each respiration.

It is best that the patient should not know that the respirations are being counted or they may involuntarily modify their breathing.

When ascertaining the quality of the pulse the respirations may be counted, and the pulse afterward. Both may be recorded at the same time.

In certain conditions, when the frequent record of temperature, pulse, or respiration is necessary, an hourly chart may be kept. The variations are recorded every hour, with treatment, nourishment, and general condition of the patient.

Such charts are usually arranged for twenty-four hours only.

BEDSIDE NOTES.

Name ---------- Ward ---------- Bed Number ----------

Diagnosis ----------

Date of Admission ---------- Physician ----------

When ordered	General Orders	When omitted

Time	Temp.	Pulse	Resp.	Urine	Def.	Treatment	Nourishment	Remarks
Total								

CHAPTER VI.

VENTILATION.

Air and its Composition—Elements Necessary to Animal Life—Natural Ventilation—Simple Methods of Supplying Fresh Air.

AIR AND ITS COMPOSITION.

The atmosphere is a mixture of about four volumes of nitrogen with one of oxygen. It surrounds the earth to a height of many miles.

The composition of the air is not absolutely constant nor exact in atomic proportions, either by weight or volume. Ordinary air contains small quantities of other substances. It always contains water, carbonic acid, and ammonia, with small amounts of the elements from the argon group; also dust and the products of animal and vegetable decomposition as impurities.

The study of the air and its impurities has received much attention because of the fact that many diseases are due to living particles conveyed by the air.

The capacity of the air for holding water increases as the temperature rises. The dampness of the air is not due to the actual quantity of moisture in it, but to the amount in proportion to that which the air can take up.

Air saturated with water has a relative humidity of 100 per cent.; if half saturated 50 per cent., etc. When the temperature falls, the moisture separates to a greater or lesser extent, and rain, dew, or fog is the result. If the temperature falls below freezing-point, frost or snow may occur.

The respiration of animals, the process of combustion and decay are constantly changing the air by removing oxygen and producing water, ammonia, and organic matter. The constant removal of oxygen is partially counterbalanced by the action of plants, which, under the influence of light, decompose carbonic acid, retaining the carbon and setting the oxygen free.

The dust always floating in the air contains both living and dead substances, which vary according to locality.

The normal condition of breathing is that the oxygen of the air breathed should be at about one-fifth the atmospheric pressure, but it has been found that life may be carried on by a gradual diminution of the oxygen to less than one-tenth. This is reached at an altitude of 15,000 feet. Any pressure less than this causes change in the relation of the gases in the blood. Animals subjected suddenly to a marked decrease (below 7 per cent.) are thrown into convulsions.

On the other hand, oxygen may be increased to a considerable extent without marked effect, even to the extent of 8 to 16 atmospheres. When the oxygen pressure was increased up to 20 atmospheres, animals experimented upon by Paul Bert died of severe tetanic convulsions.

Thus is shown that *oxygen* is the element essential to animal life. That considerable variations of pressure occur without producing ill effects is probably due to the fact that the gases in the blood are mostly in a state of chemical combination, not simple solution.

Nitrogen which forms about four-fifths of the air breathed is inert and acts as a diluent.

It may be replaced by hydrogen, if oxygen is in the usual proportions, without marked ill effect.

Of this mixture an adult person breathes about 425 cubic feet in twenty-four hours. In the air that has passed through the lungs, the proportion of oxygen is reduced and that of carbonic acid gas increased.

The amount of carbonic acid gas forms the best index of the efficiency of the ventilation of inhabited rooms.

Ventilation consists of keeping an enclosed place supplied with proper air for breathing. The usual estimation is 4 parts oxygen to 10,000 as the standard for pure air, but they differ as to the proportion to which the carbonic acid may be allowed to rise under a good system of ventilation.

To supply the lowest standard of purity, each person must be allowed 1000 cubic feet of fresh air per hour; some authorities insist that 3000 feet are required to preserve the higher standard.

The composition of inspired and expired air may be compared by the following table:

	Inspired air.	Expired air.
Oxygen	20.96 vol. per cent.	16.03 vol. per cent.
Nitrogen	79.00 vol. per cent.	79.00 vol. per cent.
Carbonic acid . .	0.04 vol. per cent.	4.40 vol. per cent.
Watery vapor . .	variable	saturated
Temperature . .	variable	that of body (98.6° F. or 36° C.)

To maintain proper ventilation three things are necessary: (1) an inlet or inlets for fresh air; (2) an outlet or outlets for foul air; (3) a motive force to produce the current. This is supplied in systems of mechanical or artificial ventilation. In what is known as natural ventilation the forces are made use of which are supplied by (1) the wind, (2) the elevation of temperature of the atmosphere of the room, (3) the draught of fires used for heating.

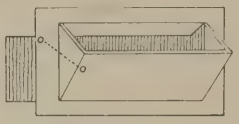
NATURAL VENTILATION.

In natural ventilation the chimney plays an important part. When a bright fire is burning in an open grate, usually no other outlet for foul air from a room is needed.

Proper inlets must, of course, be provided. The first care is to avoid cold draughts. The air should not enter horizontally nor through a grating near the floor, but vertically through openings high up, to carry the stream of fresh air to the upper part of the room, where it may be warmed before its presence is felt. A favorite form of inlet is the Sheringham. It should be placed at the top of the window, and when opened, forms a wedge-shaped projection into the room and admits the air upward through the open top.

Another method is to open one sash of the window a few inches and fill up the space by a board; the air enters in a zigzag course between the sashes. This method, suggested by Dr. Hinks Bird, is simple and effective.

FIG. 7



The Sheringham air inlet.

Fresh air may also be admitted through an adjoining room or hall by first opening the window of the room, then allowing the air to become warm before it is admitted to the sick room.

The degree of temperature does not affect the purity of the air. A cold room may contain very foul air, also a warm room may have perfectly pure, fresh air.

The degree of temperature most comfortable for the sick is between 65° and 70° F. In hospitals this degree is usually maintained during the cold months.

If a lower degree is necessary the patient is usually put near an open window or in an open-air ward.

The air should be kept pure and fresh by removing anything which may contaminate or cause an odor: excretions, vomitus, soiled clothing, or bed-linen, also soiled dressings. They are best disposed of by dropping them into a paper bag as soon as removed, the bag to be immediately taken away.

Sunlight is essential, and is second only to the need of fresh air. It is a well-known fact that the development

of both animal and plant life is retarded by the exclusion of sunlight. It is not only essential to purify the air, but there are certain forms of bacteria which are killed by its direct rays.

The cheerfulness of a room not only has effect upon the spirits of a sick person, but a sufficient amount of sunlight is of utmost importance in the treatment of disease.

Since it is known that many living bacteria exist in dust, it is obvious that the dust must be removed without being disseminated. This is best accomplished by using a damp duster, which may be made of cheese-cloth and washed out whenever it becomes the least soiled.

For this purpose a basin of warm water and soap should be used when dusting. Every article of furniture and the wood-work of the room or ward should receive attention. No disinfectant need be added to the water used for dusting, as the idea is *to gather up the dust*, and not to make a pretence at disinfection, which to be effectual must be carried out under an entirely different regime.

Floors should be swept with a soft hair broom and dusted with a "dustless mop" (one that has been treated in such a way that it gathers rather than scatters the dust).

Brooms should be washed in soap and water and dried (in the sun if possible) at least twice each week.

CHAPTER VII.

BACTERIA.

Bacteria and Their Meaning—Disinfectants—Antiseptics—Deodorants, Their Use and Relation to Each Other—Solution.

Bacteria are the lowest forms of plant life known. They differ from all higher forms of life in that their whole organism is made up of one cell.

Like other plants each possesses an individuality and presents characteristics peculiar to itself. This is shown in its size, form, color, and developement, each cell producing its kind.

Similar to other plants, they possess the power of growing in different soils (or media), and may be transplanted without injury to themselves—hence the transmission of disease.

Bacteria multiply by cell-division, and each bacterial cell may grow to a certain size, then division occurs, each part growing to the maximum size, when it in turn divides.

In some kinds of bacteria this may take place in one hour, while in others division occurs in a much shorter time.

It has been estimated that if multiplication went on unchecked, at this rate the descendants from a single

cell would number over 200,000,000,000 in forty-eight hours. However, only a comparatively small number of these do harm, or grow to the reproducing stage.

One important factor in the prevention of unlimited multiplication is that in their growth the bacteria themselves produce substances which are injurious and the accumulation of such material prevents growth and reproduction. Other means of checking their reproduction are insufficient nourishment, lack of moisture, a temperature too high or too low, or the invasion of other kinds of bacteria which may be antagonistic. Bacteria are not only unicellular but microscopic; some must be magnified 2000 to 3000 diameters to be seen, and there are undoubtedly others which never have been seen.

Bacteriology is closely related to the study of pathology and hygiene:

1. Pathology, which is the study of the effects produced upon the body by bacteria and their products, and the reaction of the body to their influence.

2. Hygiene, which deals particularly with the channels by which bacteria leave the body, their length of life outside the body, in soil, water, and air, and the method by which they are able to again infect healthy persons. Pathology and hygiene are combined in the study of the prevention and cure of disease.

All bacteria are not disease-producing. Of the many varieties discovered only a fraction of 1 per cent. are known to do harm when they enter the body. There is a class which is most essential to mankind. They not only attack and kill other organisms, but

decompose dead organic bodies, setting free elements which are utilized by higher forms of plant life.

Bacteria are very generally distributed; they occur in the air, in water, in soil, on and in our bodies, and on much of our food—in fact, they exist nearly everywhere.

The most recent classification is:

1. Cocci—Round or spherical cells.
2. Bacilli—Cylindrical, longer or shorter, or rod-shaped cells.
3. Spirilla—Spiral or screw-shaped cells.

FIG. 8

Forms of bacteria. Spores.

Among the bacilli and spirilla, cell-division takes place at right angles to the long axis of the cell.

Among the cocci, division may occur only in one plane, resulting in the formation of chains (streptococci); or in two planes, giving rise to flat sheets of cells, or irregular masses (staphylococci), or in three planes forming cubical masses (sarcinæ). After cell-division the cells may remain united or may separate.

The conditions best suited to the growth of these organisms vary according to the species. All must have food, a certain amount of moisture and heat

(90° to 100° F.), or they grow best at the temperature of the human body.

Spore Formation.—Spores are characterized by their structural and physiologic qualities. They are spherical or oval in shape and possess a much higher resistance to heat and all sorts of poisonous substances than the cells from which they originate. Spores are most frequently found in bacilli, very rarely in cocci. These spores are set free, it may be, by the degeneration of the cell itself, and under certain conditions may develop, after remaining dormant for years.

The spore stage is considered as a resting stage. It tides the species over unfavorable periods of dryness, famine, or unsuitable temperature until such time as favorable conditions occur for development.

Of the disease-producing (pathogenic) bacteria, only two of the spore-forming organisms, the anthrax and tetanus bacilli, are known to be pathogenic for man.

Disease is also produced by certain of the animal parasites (the protozoa), which, like bacteria, are low forms of life; also, they are unicellular, but are generally larger than bacteria, and differ in the methods of reproduction.

Pathogenic organisms are dangerous because of the poison (toxin) which they produce, said to be a waste product. They are always a menace because of their very general distribution and the fact that they are microscopic.

A person is infected when some organism invades the body and by its multiplication and growth produces disease (general infection); or when a certain locality

is involved, resulting in the formation of pus, either in a wound or by abscess formation (local infection).

Methods of Destruction.—1. *Sterilization* is the use of heat, either moist or dry. Moist heat is considered more effectual.

(*a*) *Boiling* (100° C. or 212° F.) for five minutes. Instruments, hypodermic needles, glass or metal catheters, irrigating tips, droppers, etc., may be treated in this way.

(*b*) *By Live Steam.*—Consists of live steam being turned into an air-tight container which holds the articles to be sterilized (one hour).

(*c*) *By steam under pressure* (autoclave sterilization).

(*d*) *By hot air* (baking).

2. *Disinfectants* are chemical agents which kill bacteria or germs (germicides).

Formaldehyde.—Rooms may be disinfected by first being sealed, then treated with formaline gas forced in through the key-hole.

Coal-tar Products.—Body discharges—the sputum from pneumonia or tuberculosis, vomitus, urine, and feces—may be disinfected by carbolic acid, 5 per cent. For linen, carbolic acid, 5 per cent., or creolin, 2 per cent., may be used. For the skin, carbolic acid, creolin, or lysol.

Corrosive sublimate (mercuric chloride, bichloride of mercury) is the best known and most effective of the metallic salts. It is valuable in a solution of 1 to 1000 for the disinfection of hands, wood-work, porcelain, glass, etc. It must not be used on metal, or on instruments or plumbing fixtures.

Alcohol in 70 per cent. is capable of killing all non-spore-bearing bacteria.

The germicidal influence of sunlight and an abundant supply of fresh air should be utilized whenever possible. It should also be remembered that simple cleanliness, obtained by the use of soap and hot water, is indispensable as an aid in the removal of disease germs.

ANTISEPTICS.

Antiseptics are chemical agents which do not kill but retard the growth of bacteria and prevent decomposition.

The disinfectants mentioned in dilute form may be used as antiseptics.

Disinfectants.	Antiseptics.
Corrosive sublimate, 1 to 1000	1 to 5000 to 1 to 10,000
Carbolic acid, 1 to 20	1 to 100 to 1 to 150
Sulphonaphtol (creolin), 1 to 80	1 to 200 to 1 to 400
Labarraque's solution (chlorinated soda)	1 to 4 to 1 to 6
Potassium permanganate	1 to 10,000 to 1 to 15,000

The most valuable antiseptics have not the power of killing bacteria. Boracic acid is the one most commonly used. It is non-irritating and non-poisonous, and may be used in the cavities of the body for irrigation with perfect safety.

Normal salt solution is only mildly antiseptic, though it is extensively used.

Chlorinated soda, 1 to 6, may be used in infected wounds; it acts also as a deodorant.

Citrate and chloride of sodium.

Citrate of sodium, 2 parts.

Chloride of sodium, 8 parts.

Water to make 100 parts.

The combination of these sodium salts, while only slightly antiseptic, is extensively used in local septic conditions.

Antiseptic powders in common use for dusting purposes are aristol, dermatol, zinc stearate, iodoform, boracic acid with starch.

DEODORANTS.

Deodorants remove disagreeable odors. The most commonly used are chloride of lime, sulphonaphtol, potassium permanganate, chlorinated soda, charcoal, and many proprietary preparations which are expensive and cannot be utilized for hospital purposes.

Many of the disinfectants are deodorants. In their use, whatever agent is employed must come in *direct contact* with that which produces the disagreeable odor.

SOLUTIONS.

To find the amount of drug required to make a solution of any given per cent.:

Reduce the required amount to grains and multiply by the rate per cent. expressed decimally.

Ex.—To make 1 pt. of a 5 per cent. solution:

1 pt. = 7680 gr.

.05

384.00 gr.

Ans.— 384 gr. = 6ʒ and 24 gr.

To find the amount of drug to be used when the strength is expressed in parts, or one part drug to any number of parts water:

Divide the required amount (ounces, drams, or minims) by the number representing the number of parts of water.

Ex.—To make 1 pt. of 1 to 20 solution:

1 pt. = 7680 ÷ 20 = 384 gr.

Ans.— 384 gr. = (6 ℥ to 24 gr.)

To make a weaker solution from a stronger:

Divide the required amount (ounces, drams, or minims) by the number representing the denominator of the weaker and multiply by the number representing the denominator of the stronger solution.

Ex.—To make 1 pt. of 1 to 1000 from a solution 1 to 20:

1 to 1000 = $\frac{1}{1000}$, 1 to 20 = $\frac{1}{20}$. 1 pt. = 7680 ♏

$$\frac{7680 \times 20}{1000} = \frac{768}{5} = 153\tfrac{3}{5}\,♏$$

Ans.— $153\frac{3}{5}$ ♏ or 2 ℥ $33\frac{3}{5}$ ♏

To make a weaker solution expressed in parts from a stronger expressed in per cent.:

Divide the required amount by the number representing the number of parts of water. The quotient so obtained divide by the rate per cent. expressed decimally.

Ex.—To make 1 pt. of 1 to 1000 from 5 per cent. solution:

1 pt. = 7680 ♏ divided by 1000 = .05)7.680

153.6

Ans.— 153.6 ♏ = 2 ℥ 33.6 ♏.

5

CHAPTER VIII.

MEDICINES.

Routes of Administration—Apothecaries' Weights and Measures—Abbreviations—Relation of Drops to Minims—The Metric System.

MEDICINES are agents used in the treatment of disease. They are derived from the animal, vegetable, and mineral kingdoms, and may be solid, liquid, or gaseous.

Many insoluble substances which were once used in the form of powders, because of their disagreeable taste, are now given in tablets, pills, and capsules.

The most commonly used liquid preparations are the aqueous and alcoholic. Of the aqueous, solutions, waters, mixtures, emulsions, and syrups, and of the alcoholic, tinctures and fluidextracts are in general use. Wines, spirits, and elixirs are less frequently used.

Solutions enter into the circulation more quickly than any other preparation, hence their very common use.

The different routes by which drugs may be administered are the:

1. Digestive tract, by the mouth, by the rectum.
2. Cellular tissues.
3. The respiratory tract.
4. By the skin.
5. Intravenously.

By the Digestive Tract.—1. Medicines are commonly given by the mouth. Solutions taken in this manner are rapidly absorbed. Fats, albuminous substances, gelatin, etc., must first be digested before they can enter the circulation.

In case of excessive vomiting, gastric disturbances, hemorrhage of the stomach, or unconsciousness, it may be necessary to give both medicine and food by the rectum in the form of an enema or suppository.

2. **The Cellular Tissues.**—This method is used in emergencies when it is necessary to get the quick action of the drug in unconsciousness and when giving by mouth is contra-indicated.

There are two ways of giving medicinal substances by the cellular tissue:

(*a*) The *hypodermic* method, which is the injection of medicines in the subcutaneous tissue with a hypodermic syringe. They are *always* given in small quantities.

(*b*) *Hypodermoclysis*, which is the injection of large quantities of fluid deep into the cellular tissue. This is usually normal salt solution, and is given to replace fluids lost. The amount varies from 1 to 2 quarts.

3. **The Respiratory Tract.**—By this method absorption is very swift, because of the extensive blood supply. It is more rapid though less practical than the hypodermic method.

Substances administered by this method must be gaseous, as oxygen; very volatile, as amyl nitrite, ether, or chloroform; or vaporized, as the inhalation of steam or atomized fluids.

4. **By the Skin.**—Inunctions, or oily substances rubbed into the skin may be used for local or general effect.

5. **Intravenously.**—Consists of injecting substances into the veins.

Used in Extreme Cases.—Usually the fluid is salt solution. It may be blood transfused directly from one person into the vein of another.

In measuring medicines extreme carefulness is necessary. As many poisons are used, a drop more than the exact amount is always dangerous.

There are several rules which should be observed, not alone for the safety of the patient but for the protection of the nurse.

1. Read the order, being positive not only of the drug but the preparation of the drug.

2. Read the label on the bottle and the strength of the preparation then compare the two.

3. Hold the bottle in the right hand, the label up, so that it may not become defaced. Hold the graduate on a level with the eyes. If held below, one gets more than the required amount. If held above, less than the amount.

Measure accurately, *again read the label,* wipe the bottle and *return it to the shelf.*

In giving powerful poisons, particularly the alkaloids, it is best to have a second nurse watch the measuring, as two persons seldom make the same mistake at the same time.

When mistakes occur, as they undoubtedly do, it is almost always the result of carelessness rather than ignorance. Such mistakes should be reported without delay.

Apothecaries' or Troy Weight.

60 grains (gr.)	=	1 dram (ʒ)
8 drams (ʒ)	=	1 ounce (ʒ)
12 ounces (ʒ)	=	1 pound (lb.)

(Liquid) Apothecaries' Measure.

60 minims (♏)	=	1 fluidram (fʒ)
8 fluidrams (fʒ)	=	1 fluidounce (fʒ)
16 fluidounces (fʒ)	=	1 pint (O)
8 pints (O)	=	1 gallon (C)

Relation of Drops to Minims.

Acid acetic	10 minims	=	18 drops
Acid acetic dilute	10 minims	=	10 drops
Acid hydrochloric dilute	10 minims	=	10 drops
Acid hydrocyanic dilute	10 minims	=	10 drops
Acid nitric	10 minims	=	17 drops
Acid nitric dilute	10 minims	=	10 drops
Acid sulphuric	10 minims	=	24 drops
Acid sulphuric dilute	10 minims	=	10 drops
Alcohol	10 minims	=	24 drops
Amyl nitrite	10 minims	=	30 drops
Chloroform	10 minims	=	40 drops
Fluidextract aconite	10 minims	=	25 drops
Fluidextract belladonna	10 minims	=	25 drops
Fluidextract digitalis	10 minims	=	20 drops
Fluidextract ergot	10 minims	=	20 drops
Fluidextract nux vomica	10 minims	=	25 drops
Oil cinnamon	10 minims	=	20 drops
Oil gaultheria	10 minims	=	20 drops

Oil peppermint . . .	10 minims	=	20 drops
Oil croton	10 minims	=	15 drops
Paraldehyde	10 minims	=	25 drops
Solution atropine . .	not safe to trust to drops		
Solution cocaine, 1 per cent.,	not safe to trust to drops		
Solution strychnine . .	not safe to trust to drops		
Spirits ether compound .	10 minims	=	25 drops
Spirits nitrous ether . .	10 minims	=	25 drops
Spirits ammonia aromat.	10 minims	=	25 drops
Spirits glonoin, 1 per cent.	10 minims	=	25 drops
Tincture belladonna . .	10 minims	=	25 drops
Tincture digitalis . .	10 minims	=	20 drops
Tincture ferri chloridi (chloride of iron) .	10 minims	=	25 drops
Tincture nux vomica .	10 minims	=	25 drops
Tincture opium . . .	10 minims	=	20 drops
Tinc. opium camphorated	10 minims	=	20 drops

It will be seen that the size of the drop varies according to the density of the fluid. A minim is always the same.

These abbreviations are not harmonious with Dunglison and Dorland.

Abbreviations.

āā (ana), of each.
A. C. (ante-cibos), before meals.
Ad. lib. (ad libitum), when desired.
Alt. hor. (altera hora), every alternate hour.
Aq. (aqua), water.

Aq. dest. (aquæ destillata), distilled water.
B. i. d. or B. d. (bis in die), twice daily.
C. (congius), gallon.
Comp. or Co. (compositum), compound.
Dil. (dilutus), dilute.
Fl. or Fld. (fluidus), fluid.
Gr. (granum), grain or grains.
Gtt. (gutta), drop or drops.
Inf. (infusum), infusion.
Lb. (libra), pound.
Lot. (lotio), lotion.
Mist. or Mixt. (mistura), mixture.
N. (nocte), at night.
O. (octarius), pint.
Ol. (oleum), oil.
Ol. Res. (oleum ricini), castor oil.
Ol. Tig. (oleum tiglii), croton oil.
P. C. (post-cibos), after food.
P. r. n. (pro re nata), when required.
Spts. (spiritus), spirits.
ss. (semis), half.
S. V. R. (spiritus vini rectificatus), alcohol.
S. V. G. (spiritus vini gallici), brandy.
S. F. (spiritus frumenti), whisky.
S. O. S. (si opus sit), when necessary.
Sol. (solutio), solution.
Syr. (syrupus), syrup.
T. i. d. (ter in die), three times daily.
Tr. or Tinct. (tinctura), tincture.
Ung. (unguentum), ointment.

THE FRENCH OR METRIC SYSTEM OF WEIGHTS AND MEASURES.

The metric system is a decimal system the unit of which is the meter. It is the system of measurement of science, and has been in use in European countries since 1801. It is legalized in the United States, but is not compulsory.

As early as the seventeenth century the idea of adopting a scientific measurement had been suggested.

In 1790 a committee was chosen to decide the length of the meter which was to be the unit of length.

It was not until 1799 that a report was made, when it was decided that the meter was to equal one ten-millionth the distance from the equator to the north pole (or 39.37 inches).

A bar of platinum is now preserved in Paris showing the exact length, so that the unit may always be the same.

The unit of volume and weight is based upon the length of the meter.

Any term less than the unit is expressed by the Latin prefixes *deci, centi, milli.* Greek prefixes, *deka, hecto, kilo,* express the terms greater than the unit.

The unit of volume or capacity, which is the liter, is a cube the side of which is $\frac{1}{10}$ of a meter, or a decimeter.

For liquid and dry measure the unit is the same.

TABLE.

10 milliliters (ml)	=	1 centiliter (cl)
10 centiliters (cl)	=	1 deciliter (dl)
10 deciliters (dl)	=	1 liter (l)
10 liters (l)	=	1 dekaliter (Dl)
10 dekaliters (Dl)	=	1 hectoliter (Hl)
10 hectoliters (Hl)	=	1 kiloliter (Kl)

The unit of weight is the gram, and is equal to that of 1 cubic centimeter of water at its greatest density, 4° C.

10 milligrams (mg)	=	1 centigram (cg)
10 centigrams (cg)	=	1 decigram (dg)
10 decigrams (dg)	=	1 gram (gm)
10 grams (gm)	=	1 dekagram (Dg)
10 dekagrams (Dg)	=	1 hectogram (Hg)
10 hectograms (Hg)	=	1 kilogram (Kg)

Instead of the liter 1000 cubic centimeters is frequently used.

The cubic centimeter and the gram are the terms most often used in prescriptions.

APOTHECARIES' MEASURE AND METRIC EQUIVALENTS.

1 gram	=	15.432 grains
1 cubic centimeter	=	16.23 minims
1 liter (1000 c.c.)	=	33.81 fluidounces
1 grain	=	.065 gram
1 ounce	=	31.103 grams
1 fluidram	=	3.7 cubic centimeters
1 fluidounce	=	29.57 cubic centimeters

Approximate Equivalents.

1 cubic centimeter	=	15 minims
4 cubic centimeters	=	1 fluidram
30 cubic centimeters	=	1 fluidounce
1 liter (1000 c.c.)	=	1 quart
1 gram	=	15.5 grains

To find approximate number of grams. Reduce the quantity to grains and divide by 15.

HYPODERMIC OR SUBCUTANEOUS TREATMENT.

Drugs for hypodermic use should be non-irritating, if possible; for this reason specially prepared tablets which may be dissolved in a small amount of water are in general use.

Alcoholic and ethereal preparations are always irritating and should be given deeply into the tissues. Camphor which is also irritating and extensively used is prepared in oil to render it as bland as possible.

When giving a hypodermic an area should be chosen remote from bony prominences, nerve trunks, and large vessels.

The danger of injecting a powerful drug into a vessel is that it may go to the centre in a concentrated form and alarming symptoms or death may result.

A hypodermic tray should contain an alcohol lamp; a jar (covered) containing alcohol and sponges for preparing the part; a spoon in which the needle may be boiled; a hypodermic syringe in a medicine glass

with alcohol, unless a solid metal or glass syringe, which may be boiled; a bottle of distilled water.

Having boiled the needle in the spoon, and making both sterile, the needle should be dropped into alcohol to cool.

Wipe off the mouth of the bottle containing the drug and that which contains the distilled water with a sponge dipped in alcohol; drop a tablet directly into the spoon from the bottle, without touching it with the fingers; add enough distilled water to dissolve; fill the syringe with the solution thus made; screw on the needle securely and expel the air by holding the syringe in a vertical position and bring a tiny droplet to the point of the needle.

Hold the tissues loosely away from the bone, insert the needle quickly straight into the tissues, withdraw slightly and expel the fluid slowly.

Hypodermic needles when not in use should have wires through them; also, they should be dried by holding them over the flame before being put away.

Orders for medicines or treatment of hospital patients should always be written by the person ordering, or at least signed by him.

Only in case of emergency, *when the doctor is present*, should a verbal order be recognized, and *never* if received over the telephone.

When necessary to keep an accurate record of treatment, the twenty-four-hour chart may be used. (See Bedside Notes, Chapter IV.)

CHAPTER IX.

ENEMATA.

Kinds—Frequency and Method of Giving—Utensils Used and Their Care.

An enema is the injection of fluid into the rectum, classified according to the nature of the fluid or the work it is expected to do.

1. **The simple enema** is used to empty the lower intestine and rectum; it is laxative in effect, and consists of soap and water at body temperature.

The amount varies according to the size of the patient and existing conditions. For a baby, ½ to 1 ounce; for an adult, 1 pint to 2 quarts; 1 quart is most frequently given.

To the simple enema, glycerin may be added in the proportion of 1 ounce to 1 pint of suds.

2. **The stimulating enema,** so called because it stimulates peristalsis, is given in obstinate cases of constipation and to relieve flatulence. It should be given high and may consist of:

Spirits of turpentine,		
Olive oil or glycerin,		
Magnesium sulphate,	āā	℥ij
Warm water,	ad q. s.	Oj

Spirits of peppermint may be substituted for the turpentine if there be considerable distention.

3. **Oil enema** consists of olive oil or cotton-seed oil, from 4 to 6 ounces; it is given at body temperature, and is to be retained three to four hours, when it is followed by a simple enema, to be expelled. It is used after operations on the rectum or the repair of a lacerated sphincter muscle.

4. **Shock enema** consists of stimulants given in case of shock or when general stimulation is indicated. Salt solution, or salt solution and black coffee, usually makes up the bulk of the enema. Brandy, strychnine, and digitalis may be added if necessary. The amount should not exceed one pint, and should be heated to 110° to 112° F. Heat is an important factor in treating the condition of shock.

Salt solution may be given by the drop method and continued for an indefinite period, from thirty-six to forty-eight hours in extreme cases.

An irrigating bag should be about half full of salt solution, which should be hot. It may be kept so by hanging a hot-water bag on either side of it, the whole to be covered with thick flannel.

A catheter should be used instead of a rectal tube. The number of drops may be regulated (usually 30 or 40 per minute) by using a clip on the tubing.

5. **Nutritive enema** should consist of easily assimilated liquid food. In amount it should not exceed 8 ounces for an adult, and should be given at body temperature every 6 to 8 hours. It is necessary that the rectum be thoroughly cleansed before introducing

a nutrient. For this reason a cleansing enema should be given at least once during the twenty-four hours, preferably in the morning, the nutrient to be given one or two hours afterward.

When absorption is very poor 3 or 4 ounces of normal salt solution may be given about one-half hour before each nutrient.

Nutritive enema may consist of

No. 1.

Glucose,		℥ij
Water,		
Peptonized milk,	āā	℥iij

No. 2.

Egg,	1
Peptonized milk,	℥vj
Beef juice,	℥j
Salt,	gr. xv

Brandy may also be added if stimulation is desired. 10 to 20 minims of tincture of opium may be used to allay irritation.

A patient may be helped to retain the fluid by placing a small pad over the anus and applying tightly a T-bandage.

Eggs, or the whites of eggs, are often used. It is a question whether or not any appreciable amount is absorbed.

Possibly glucose, milk-sugar, liquid peptones, peptonized milk, and salt solution are of most value.

6. **Emollient.**—Is used in diarrhea to allay irritation of the mucous membrance. Boiled starch, of the consistency of heavy cream, may be given at body temperature. 10 minims of tincture of opium to 1 pint of the starch is sometimes used.

7. To allay thirst, salt solution or warm water may be given.

RECTAL IRRIGATIONS.

Rectal irrigations are given in cases of colonitis and acute or chronic diarrhea. They consist of large quantities of salt solution or water at body temperature. Boracic acid, 2 per cent. solution, is less frequently given.

A solution of alum or silver nitrate may be used for its astringent effects.

A glass irrigator or fountain syringe may be used. A special rectal irrigating tube or two catheters, fastened together at the eye (one to serve for the inward flow and the other for drainage) and a douche pan are necessary. The irrigator should hang only high enough to allow the fluid to flow through slowly and without force.

Preparation and Method of Giving an Enema.—In all cases the bed should be protected with a rubber and draw sheet, and the patient comfortably covered with a blanket.

A tray at the bedside should contain a pitcher holding the fluid to be used; a rectal tube, the funnel, and an oil cup in a dressing basin; a pus basin to receive the tube after using; and a bed-pan.

When possible the patient should be placed on the left side with the knees drawn up. The tube should be lubricated, filled with the fluid, so that no air may be injected, and inserted slowly, the tube not being allowed to become empty until the enema is given.

If necessary to keep the patient on the back while giving the enema, the hips or foot of the bed may be elevated.

After using the utensils, they should be rinsed in cold water, then washed in hot water and soap, and the rectal tube boiled. It may then be dried and put away, or kept in a covered jar of diluted alcohol.

CHAPTER X.

SYMPTOMS.

Classification and Significance—Fevers, Their Types and Changes Brought About in the Body—Chills—Convulsions.

Symptoms are signs by which abnormal conditions of the body may be recognized.

There are two distinct classes: Objective symptoms are those evident to the observer, as redness, a rash, or swelling. Subjective symptoms are those known to the patient, as pain or nausea. A chill is both objective and subjective.

Nearly every disease presents a group of symptoms, characteristic of that disease, and by this group it is recognized. One disease complicated by another somewhat modifies the signs, but the characteristics of both present themselves.

That a nurse may be of value to patient and doctor alike, it is essential that she observe and report any abnormalities or conditions that exist, and learn to report them clearly and concisely, making a plain statement of facts.

There are conditions or symptoms which may exist in any case important for a nurse to observe, and which may have a distinct bearing on the treatment, and possibly the ultimate recovery of the patient.

Development.—First it should be observed if the patient is properly nourished, also if there be obesity or great emaciation. In children the large, flat head, barrel-shaped body and small, crooked limbs, and the inability to sit up or walk (a condition known as rickets) are all evidences of poor nutrition. This is not always due to an insufficient amount of food—in bulk—but sometimes *improper* food.

A deformity in an adult may be due to some past condition. In a child it may be due to some present trouble. The nature and extent of the deformity should be carefully noted.

The position the patient assumes, be it either child or adult, is that which gives the greatest degree of comfort. For example, one with colic doubles up, and draws the knees close up to the body; one with difficult breathing assumes an upright position; the baby puts its fingers in the mouth when teething, or the hand to the ear, holding the head on one side if the ear aches.

The Color of the Skin.—If it be white, with a transparent, waxy look, it is usually due to anemia, a condition of the blood. A sudden pallor may mean faintness or pain. A gradually increasing pallor, with blue lips and circles around the eyes, accompanied with restlessness; a low or subnormal temperature; rapid pulse, increasing in rate; "air hunger" and thirst are signs of hemorrhage. *It may be concealed.* But it is none the less important, and is one of the gravest of emergencies.

Blue color denotes an insufficient amount of oxygen;

either the heart or the respiratory organs may be the primary cause.

A yellow skin (jaundice) is usually indicative of gall-bladder trouble or some obstruction of its ducts.

Any eruption, its character and extent, are of importance; scars, either the result of surgery or old ulcers, their location and color, should not be overlooked.

The eyes afford an important index to the mental condition. Their movement, expression, and the size and reaction of the pupils should be noted.

The mouth, tongue, and lips: Whether they be moist, dry, cracked, or bleeding; if there are ulcers on the tongue or inside of the cheeks; if the tongue is coated, and its character also if it be tremulous.

Any discharge from the nose may mean a local or cerebral condition. It is particularly apt to be cerebral if the discharge be purulent. A bloody, mucous, or serous discharge is more likely to be local.

Mouth breathing, particularly in children, is rather common. It may mean only a temporary condition, or it may be due to adenoids, the removal of which may become necessary, as permanent obstruction may be the cause of deafness.

It is possible for a person to modify the respiration to a certain extent, but the type, frequency, and ease should be noted, also if the symmetry in the action of the chest is lost. It frequently occurs in persons who have had pleurisy that one side of the chest is nearly or quite normal, while on the other side there is little or no action.

Retraction of the soft parts, below the sternum and

clavicle, sometimes even between the ribs, denotes obstruction of the larynx. In diphtheria or croup it is an important symptom, and one which should never escape the notice of a nurse. It may develop suddenly, and therefore no time should be lost.

When nausea or vomiting occur, the time, quantity, and quality are of importance. If it be directly after taking something into the stomach, food or medicine, it shows that that particular article has caused irritation, or there may be persistent vomiting. Occasionally a person may vomit large quantities of fluid even when nothing has been taken by the mouth for a number of hours, possibly all night. This is probably the normal secretion of the stomach which cannot leave by the natural exit, showing there is an obstruction. This is often caused by cancer.

Blood vomited, if fresh, clotted, or mixed with particles of food, is easily recognized, but when acted upon by the gastric juice it has the appearance of coffee-grounds, or it may be decomposed and black (the so-called "black vomit").

Blood from the stomach differs greatly from that from the lungs. From the latter it is bright red and filled with air, making it frothy.

If there is diarrhea present it is necessary to know the character and frequency of the evacuations. There may be blood and mucus, or large watery stools.

Clay-colored stools denote the absence of bile in the intestines and consequent decomposition of the intestinal contents.

Slow bleeding into the intestines is evidenced by the

"coffee ground" or black stools—if digested or decomposed blood.

Distention of the abdomen may be caused by either gas or fluid. If gas, it is indicative of obstruction due to tumor or adhesions, or may be caused by a temporary loss of the peristaltic movement of the intestines. If a quantity of fluid collects in the abdominal cavity, a diseased condition of the heart, kidneys, or liver may be the primary cause. With this condition there is likely to be edema (a swelling in which the cell spaces are distended with fluid). This pits upon pressure.

The temperature, pulse, and respiration afford important symptoms and are discussed elsewhere.

FEVER.

Pyrexia or fever is understood to mean an abnormally high temperature. It is always a symptom, not a disease, and must be considered as one of a group of symptoms caused by some derangement of the chemistry of the body.

Causes may be generated from within, as the failure to cast off waste products (urea); from certain changes in the blood (in anemia); from exposure to extremes of heat, as sunstroke; from mental abnormalities, as hysteria. The most frequent cause is due to bacterial infection.

In either case, they act by affecting the nervous system, and the normal balance between heat elimination and heat production is lost. This is more often due to overproduction than to lack of radiation.

Classification.—*Continued Fever.*—The temperature may remain high, with only slight variations for a longer or shorter period. It may be for only a few hours, or it may last days or weeks. Typhoid is a typical continued fever.

Intermittent type is marked by periods when the temperature may fall to normal, and then rise again. Malaria is an example of this condition.

Remittent type is characterized by a temperature continually above the normal, which rises and falls, but without intermissions. The remissions between afternoon and morning temperature equals or exceeds 2°. For example, tuberculosis.

Another classification which includes a group of accompaning conditions is:

The Sthenic Type.—Temperature high; skin hot and dry; pulse full, strong, rapid, and of high tension; nervous system overstimulating and delirium may become active.

The Asthenic Type.—Temperature high; skin cold and clammy; pulse feeble; nervous system depressed.

In rare cases there is an inverse type, when the temperature is highest in the morning, the opposite of the general rule.

The return from a high degree of temperature to normal is known as the defervescence. If this return is gradual it is spoken of as lysis; if sudden, it is called crisis.

Recrudescence is the rise in temperature, lasting only a short time, after it has regained the normal.

When fever returns with all its accompanying symp-

toms a reinfection has taken place. It is generally known as relapse. The elevation of temperature, as a rule, is accompanied by certain symptoms referable to other organs and tissues.

Changes Which Take Place in the Skin.—First, according to type, moist or dry. Second, the various eruptions associated with the eruptive fevers.

Tiny vesicles (blisters) often appear in great numbers upon various parts of the body.

Delicate skins often show a general *rosy flush*. This is probably due to the increased quantity of blood in the cutaneous capillaries.

In the later stage desquamation may take place—*always* in the eruptive fevers.

Mucous Membranes.—Herpes, sometimes known as fever sores, may occur, particularly in pneumonia and malaria.

There is thirst and dryness of the mouth and tongue; the latter may be swollen, cracked, or have indentations made by the teeth. The teeth, tongue, and lips may have a deposit of sordes. (Sordes is an accumulation of mucus, the natural secretion of the mouth; discarded epithelial cells; blood; and a multitude of bacteria.)

The lips become fissured and the gums spongy and bleeding. The tongue becomes tremulous, and has a coating which varies from a white, furry coat to a dark brown crust.

The pharynx is at first dry, and may be the seat of a catarrhal inflammation; the tonsils may be swollen or ulcerated; the salivary glands tender or swollen.

The membranes of the eyes and nose are congested,

and there is an increase of their watery secretion. Nose-bleed may occur, especially in typhoid.

Organs of Digestion.—The appetite is diminished or entirely absent.

At the onset nausea is common, and vomiting often follows:

Gas in the intestines causes little discomfort, *except in typhoid*, in which it frequently occurs, and is the result of partial paralysis of the muscular coat of the intestines, due to the general infection rather than by the presence and growth of bacteria.

Usually there is constipation, caused by depletion of fluids. Diarrhea may occur in rare cases; however, constipation is the general rule.

The Circulatory System.—The pulse in fever is generally one of increased force and frequency and of high tension. As a rule the increase is proportionate to the degree of temperature, though there are, of course, exceptions to this rule, according to individuals and the type of the disease.

In children the pulse is particularly prone to increase out of proportion to the rise in temperature, sometimes reaching 150 to 170 per minute.

A dicrotic or intermittent pulse or one irregular in force or rhythm denotes heart weakness. Any sudden increase in rapidity or weakness is likely to indicate the onset of some complication.

Position, emotional excitement, or any muscular effort influence the strength and rapidity of the pulse to a considerable degree.

Consequently the position should always be a *recum-*

bent one, for any saving of the heart's strength may be a considerable factor in the preservation of life if the disease be of long duration.

Respiratory System.—The number of respirations may be increased and the depth of breathing diminished even when there is no lung complication.

When pulmonary disease exists, the respirations may be rapid, irregular, and painful. In marked pulmonary disease the breathing may become difficult, or become almost impossible when the patient is lying in bed and it becomes necessary to have him sit up. A cough may exist, often with expectoration.

Urinary System.—The urine is lessened in quantity; of high specific gravity; dark in color and possibly turbid. Upon standing it often throws down a reddish-brown sediment, consisting usually of uric acid or urates. It may cause a burning sensation on being voided, due to its increased acidity. In severe cases albumin, casts, and even blood may appear; these, however, do not mean a permanent impairment of the kidneys.

As the disease progresses toward recovery the amount increases and the urine becomes more normal in all respects. Retention of urine is rare in febrile diseases.

Nervous System.—Febrile diseases, particularly when the onset is rapid, usually are ushered in with a distinct chill; there may be marked shivering, pallor, blueness of lips, and chattering teeth, or there may be chilly feelings of greater or lesser severity.

In a child it is often a convulsion, which may vary from slight muscular movements of the face and extremities to violent movements of the whole body.

Following this chill or convulsion the rise in temperature, accompanied by other symptoms, appears.

Secondary chills usually indicate some complication. Secondary convulsions are rare. When they do occur, they are usually due to hysteria or the presence of waste products which have not been eliminated by the kidneys.

Headache is one of the most frequent symptoms at the onset. It may vary from a dull ache to an intense, persistent, and almost unendurable pain. At times it is of the neuralgic type. The pain is usually in the forehead and temples, more rarely in the top and back of the head.

Pains in the back, limbs, and bones often accompany the headache. Dizziness exists, which is increased upon assuming an upright position.

Mental symptoms are common manifestations. They vary from a mere dulness and indisposition to mental exertion, to extremes of delirium, or absolute coma. These symptoms vary according to the temperament of the individual and the type and severity of the disease.

Extremes of mental disorder usually manifest themselves when the disease is at its worst.

Delirium may be of a mild type and appear only at night, or it may become so noisy and violent that restraint is necessary.

Habitual users of alcohol are especially liable, during pneumonia, to develop delirium tremens.

The sense of taste is perverted or wholly lost. Hearing may be impaired in typhoid, but more often it is

abnormally acute; there may be ringing or other noises in the ears.

Infectious fevers may be complicated by middle-ear infections.

The secretions of the eyes at first increase, and later diminish, causing dryness. At times the lids may be gummed together. There is often dread of bright lights.

Fever is always accompanied by increased tissue waste and consequent emaciation, which is increased by the disinclination of the patient to take food and the inability on the part of the digestive and assimilative powers to supply the increased bodily nourishment.

Chills are nervous phenomena varying in intensity from slight shivering to involuntary movements of sufficient strength to shake the bed; they may be caused by coming in contact with something colder than the body, or by poison (infection) taken in, which acts on the nervous system. This is the most frequent cause. Chills are an accompaniment of local infections, and diseases which are rapid in their onset are ushered in with a chill. After a chill the temperature may be elevated to 104° or 105° F., dependent upon the cause of the chill, and the pulse and respiration affected in proportion to the degree of temperature.

Convulsions indicate an irritation of the nerve cells of the brain resulting from various causes, among which are kidney diseases, lead poisoning, paralytic dementia, some local destructive disease of the brain, tumor of the brain, or scar tissue, the result of some previous injury.

Convulsions resulting from any of the above causes are symptomatic, while those of epilepsy are idiopathic.

A patient in convulsions should be kept from injuring himself, and if they are so severe that there is danger of the patient's succumbing to physical exhaustion, ether or chloroform should be administered.

The nurse should observe the pupils of the eyes, their relative size, and whether they react to the light; the cry which precedes the convulsion and its character; the time the attack comes on, as an epileptic attack may come on in the night, or when a person is sleeping; an hysterical attack does not thus occur; whether the patient loses consciousness at once or gradually. It is important to note the order in which the movements appear, also their character.

CHAPTER XI.

BED-SORES.

Their Cause and Treatment.

Bed-sores are so called because they occur on persons who are compelled to lie in bed.

They may be defined as lesions of the surface of the body, often becoming gangrenous.

Bed-sores, in many instances, may be prevented, while in some cases they cannot, in spite of all care.

The predisposing causes are poor circulation, malnutrition, paralysis, and edema.

Undue pressure and neglect are invariably the immediate causes.

Restless patients may rub the skin off the elbows while lying in bed, which may, through neglect, result in a deep lesion. The application of an oily lotion and protection from further injury is usually all that is necessary.

Bed-sores caused by moisture appear as a red, swollen area, upon which the skin is macerated, and in places the epidermis is separated from the true skin, forming blebs.

The skin is easily broken and rubbed off, leaving a raw surface, which is liable to all kinds of infection. Patients who are incontinent, either from paralysis

or other causes, are particularly liable to develop bed-sores of this class.

The treatment consists in making the part absolutely clean by first washing with soap and water, then applying a 4 per cent. solution of boracic acid. The surface should be thoroughly dried with sterile cotton and powdered with an antiseptic powder. The main object is to keep the part thoroughly clean and dry. It is best not to cover with a dressing, but it is essential to turn the patient from side to side that no pressure may exist in that particular spot.

Deep sloughing sores are caused by poor circulation, either local or general, and pressure. The greatest number are of this class, and are the only ones unavoidable. They occur in persons who are paralyzed and cannot change their position. That sensation is lost and they do not suffer discomfort, together with the generally poor circulation, results in their rapid development. A sore may develop in a single night or a few hours. Death has sometimes been attributed to the absorption of toxins from bed-sores of this class.

They appear first as a dark red area, afterward becoming a deep purple or black, from which the skin separates. This darkened area draws away from the surrounding healthy tissues and may slough out or be cut out, leaving a deep, open, infected wound, which must heal by granulation, if, indeed, healing ever takes place.

The treatment is usually ordered in each individual case. It consists of hot, moist dressings until the

slough is removed, followed by one which will promote granulation, as fluffed gauze moistened with balsam of Peru, or equal parts of alcohol, glycerin, and tannin, loosely packed in.

Pressure sores are usually the result of the improper application of some apparatus, splint, plaster cast, or bandage.

The undue pressure is in a localized area, cutting off or impeding the circulation. A deep slough results. They are less rapid of development than those caused by *general*, poor circulation. The treatment is the same as for bed-sores.

There is nothing which tends to show poor nursing more than does a bed-sore, for they may in the majority of cases be avoided.

First, there should be absolute cleanliness; the bed dry and free from crumbs and wrinkles; all undue pressure should be removed, by changing position, and the use of air-rings and pads; any friction should be removed or prevented by protecting the part.

As a routine the back should be rubbed with alcohol and dusted with talcum powder at least once a day. In many cases this is necessary every few hours. This not only toughens the skin and stimulates the circulation, but affords an opportunity to inspect the prominent parts thoroughly, particularly at the shoulder-blades and at the tip of the spine. Any red spots which cannot be diffused by rubbing, or places where the skin is broken or worn off, should receive immediate treatment.

CHAPTER XII.

URINE.

Normal and Abnormal—Catheterization and its Relation to Cystitis—Bladder Irrigation—Preparation of Specimens—Twenty-four hour Amount—Douches.

The urine affords the most important index of the amount of waste excreted by the body. It is dependent upon the perfect action of the kidneys, modified to a greater or lesser degree by the food and the amount of fluids ingested. Hence any abnormality in the urine is of utmost importance.

Normal urine in quantity is about 3 pints, or from 45 to 50 ounces.

Color varies from a pale amber to a brownish shade; this variation is due to the relative amount of coloring matter held in solution.

The reaction of normal urine is acid. The degree of acidity varies at different periods of the day. Urine voided in the early morning is strongly acid, while that passed during and after digestion, especially if the food is largely vegetable in character, is neutral or may be slightly alkaline.

The specific gravity is 1.015 to 1.025.

Of the total quantity of urine voided in twenty-four hours (3 pints or 1500 c.c.) the normal constituents are:

	Grams.
Total quantity	1500.00
Water	1440.00
Solids	60.00
Of the total solids:	
Urea	30 to 35.90
Uric acid	.75
Sodium chloride	16.50
Phosphoric acid	3.50
Sulphuric acid	2.00
Ammonia	.65
Chlorine	11.00
Potassium	2.50
Sodium	5.50
Calcium	.26
Magnesium	.21
Creatinin	.90

The most abundant constituents are water, urea, and sodium chloride.

When only a small amount of urine is voided in twenty-four hours it is usually of a high color. It is still normal if the requisite amount of solid matter is present; this is particularly noticeable in patients with high temperature, being due to depletion of fluids in the body. Such urine, upon standing, throws down a sediment resembling brick-dust in color. This will disappear upon heating or adding water, again showing concentration.

A sediment which will *not* disappear upon the addition of water is usually pus. Decomposed pus renders urine thick and ropy.

Abnormal color is due to bile, blood, or the administration of drugs.

Blood from the bladder, if fresh, gives to the urine a bright red shade; if from the kidneys, usually a smoky, brown, or black color. The difference in shade is due to the quantity of blood and amount of decomposition which has taken place.

Urine which contains blood (unlike high-colored urine) will retain its red or brown shade when water is added so long as any color remains.

Bile gives to the urine a dark brown, greenish, and in extreme cases an almost black color. This may be recognized by the yellow stain which it gives to white fabric (paper or cloth).

Other abnormal constituents are albumin and sugar, which can only be determined by chemical tests.

Urine containing sugar is usually pale in color and voided in large quantities. It may be four or five times the normal amount. This, unlike normal pale urine, will have a high specific gravity, 1.030 or over, due to the amount of sugar held in solution.

Absence of urine may be due to retention or suppression.

Retention.—The condition in which urine is secreted and retained in the bladder may be caused by stricture, paralysis, unconsciousness, nervousness, or some surgical procedure or injury. This is not considered an especially serious condition, and may be relieved by use of a catheter.

Suppression.—Suppression of urine means that urine is not being secreted normally. That the poisonous urea is not being thrown out of the body. Suppression is, therefore, an important symptom, and indicative of some impairment of the kidneys, and sooner or later the patient must, in some degree, succumb to uremic poisoning, with possibly convulsions, coma, or death. Complete suppression results in death in a short time.

Incontinence.—Incontinence of urine is the inability to retain it in the bladder; paralysis or unconsciousness may be the cause. An overdistended bladder will cause incontinence. Catheterization at regular intervals will relieve this condition.

Catheterization.—Catheterization is withdrawing urine from the bladder by use of a catheter.

The bladder is very easily infected. Urine under the influence of bacteria decomposes quickly, furnishing for them a suitable medium in which to grow and multiply, causing cystitis (inflammation of the bladder).

Catheterization must be performed under the strictest aseptic regime.

Due consideration should be given to the choice of catheters. The glass catheter, which may be kept beautifully clean, is in some cases contra-indicated. It would not be safe to use a glass catheter during labor, nor in case of a violently delirious or insane patient. A soft rubber catheter is safer. Even in the hands of an unskilled person, provided those hands are clean, a sterile, soft rubber catheter can do little harm.

Preparation.—Choose two catheters (always two, in case one may become contaminated in some way), fold them in a towel and boil ten minutes at least. These should be taken to the patient in the basin in which they were boiled and must not be uncovered until used.

At the bedside there should be a basin of water and green soap; a second one of boracic acid, 4 per cent.;

pieces of gauze; sponges or puffs, and a pus basin for used sponges.

If the hands of the nurse are to be prepared at the bedside, there should be ready for her use one basin with green soap and water with a brush and one basin containing 70 per cent. alcohol or bichloride of mercury, 1 to 1000.

Arrange the patient comfortably on a bed-pan, with knees slightly flexed. Fold the bedclothes back to the knees, covering the upper part of the body, with a blanket or sheet; the thighs should be covered with a second sheet, tucking it well down under the buttocks.

Separate the labia and cleanse thoroughly, first with green soap and water, then sponge with boracic acid. (If the patient has any venereal disease, bichloride of mercury, 1 to 2000, may be used, then rinsed off with sterile water.)

If a glass catheter is used, test the end to see that there are no sharp places, which may be the result of boiling; hold the catheter so that it will not become contaminated and insert quickly about $1\frac{1}{2}$ or 2 inches; *never use force.* In case of obstruction, withdraw the catheter slightly and wait for a minute, then repeat the attempt. A spasmodic contraction of the urethra sometimes takes place which will pass away almost immediately.

If there has been considerable distention, the bladder should never be entirely emptied; 20 to 25 ounces may safely be withdrawn, and the balance allowed to remain for three or four hours, then the catheterization

should be repeated. A greatly distended bladder may collapse if completely emptied, causing temporary paralysis after the tissues have been stretched to their utmost.

Cystitis.—The most important treatment in cystitis is local, and consists of catheterization and bladder irrigation. In severe cases the patient may not be able to void urine naturally, and the accumulation of a few ounces in the bladder causes great discomfort, which may be relieved by catheterization, followed by irrigation. Usually 2 per cent. boracic acid sterile water solution or salt solution may be used, at the temperature of the body (about 100° F.).

A glass or rubber irrigator may be used. Both irrigator and tubing should be boiled, and should be just high enough to enable the fluid to flow without force.

The patient being on the douche-pan, the bladder should be emptied with a soft rubber catheter, which, without being removed, should be connected with the tube of the irrigator and a small amount of the fluid allowed to enter the bladder. The bladder should be emptied each time through the catheter and the irrigation repeated until fluid returns clear.

To prepare specimens for the laboratory, a clean specimen glass or bottle should contain not less than 5 or 6 ounces, enough for all the tests it may be necessary to make. The name of the patient, ward, and bed number, and the time when the specimen was obtained should also be attached. If it be a catheter specimen, that fact should be plainly written

on a label and attached to the bottle or glass, which should be covered to prevent contamination.

Should the specimen be wanted for bacterial examination, it should be a catheter specimen drawn directly into a bottle which has been sterilized and the mouth stopped with sterile non-absorbent cotton.

To obtain a specimen of twenty-four-hour urine, the bladder should be emptied at a certain hour. From that time all urine should be saved until the same hour the following day, when the bladder should again be emptied. A twenty-four-hour specimen is taken from this amount. It should be marked *twenty-four-hour specimen,* so as not to confuse it with a morning or fresh specimen.

DOUCHES.

A douche is a stream of water or other fluid directed against some part of the body. It is used for purposes of cleanliness in washing out cavities; for its stimulating effect; to relieve inflammation; also in case of hemorrhage.

The vaginal, the rectal (described under enemata), and the aural douche are the most frequently given.

The vaginal douche, when used for cleanliness, consists of 2 to 3 quarts of mild antiseptic solution at body temperature (boracic acid 2 per cent., bichloride of mercury 1 to 10,000, or potassuim permanganate 1 to 15,000 may be used).

To relieve inflammation it must be given hot, 110° to 118° F., and should consist of 4 to 5 quarts, usually

of sterile water or boracic acid solution. It must be remembered that this is the only way heat can be applied directly to the parts, hence the treatment must be prolonged and the utmost care observed in making the solution the required temperature.

To guard against infection or secondary infection, absolute cleanliness should be observed. The irrigator tubing and douche point should be sterilized each time before using.

The patient should lie on the back, the hips slightly elevated, and the legs flexed. The irrigator should be only high enough to allow the fluid to run gently, and should be flowing through the tube when inserted.

Frequently 110° F. is as hot as can be borne at first; the heat may be increased gradually. In all cases the thermometer should be used to test the temperature of the solution.

When the patient complains that the return flow over the external parts is uncomfortably warm, vaselin may be applied before the douche is given, which will somewhat lessen the discomfort.

CHAPTER XIII.

FOOD AND FOOD VALUES.

Classification—Chemistry and Value—Special Diets—Infant Feeding—Forced Feeding.

Food is any substance which when taken into the body is capable of supplying heat or energy, of building up the body, or of repairing waste.

Every movement of our bodies require energy, which means that a certain amount of heat must be supplied.

In the locomotive, energy comes from oxidation of the fuel with which it is supplied. In the body, food serves as fuel; first becoming, through a process of chemical changes, a part of the body.

Not all the food taken into the body is converted into heat or used up as energy. Some is stored up usually in the form of fat, in the subcutaneous tissue, or as glycogen, in the liver.

The nutritive value of any foodstuff is measured by the heat, set free during its transformation into those products in which it is to leave the body. The unit of this measure is the calorie.

A calorie represents that amount of heat necessary to raise 1 kilogram of water 1° C. This in mechanical force is equal to 1.54 foot tons, or sufficient energy to raise 1 ton 1.54 feet.

In the Centigrade scale 0° is freezing-point, 100° boiling-point. Therefore, to raise 1 kilogram of water at 0° C. (freezing-point) to 100° C. (boiling-point) would require heat equal to 100 calories.

The necessary amount of food varies according to the weight and activity of the individual. The proper choice of food is dependent upon the knowledge of the food principles and the amount of energy they yield.

The value of the different food principles when oxidized in the body are approximately:

Organic Foods.—1 gram of protein yields 4 calories.

1 gram of carbohydrate yields 4 calories.

1 gram of fat yields 9 calories.

Water is an inorganic food and has no caloric value, but is absolutely indispensable, because it holds the products of digestion in solution, forms the principal part of the blood stream, and makes up about 70 per cent. of the body weight.

Salts also have no caloric value, and are equally indispensable.

Fat can replace protein or carbohydrates. Protein can replace fat and carbohydrates, and be partly replaced by them; but that which represents the amount necessary to replace that lost by the breaking down of tissues *cannot* be replaced.

If fat is combined with protein and carbohydrates, less than one-half the quantity of protein is necessary to repair body waste.

It has been estimated that a man weighing 154 pounds (70 kilograms), to perform moderate work would require 40 calories per kilo. of weight for

twenty-four hours, or $70 \times 40 = 2800$ calories, sufficient heat to bring 28 kilograms of ice to the boiling-point; for laborious work he would require 60 calories per kilo, or $60 \times 70 = 4200$ calories. At rest he would require 30 calories, or $30 \times 70 = 2100$ calories.

A mixed diet is always more completely absorbed and more palatable. Of protein about 80 per cent. is absorbed, fats almost completely, and carbohydrates completely. Foods which leave a small amount of residue are desirable, as it stimulates peristalsis, thereby regulating the bowel.

Among the important things to be remembered are the regularity of meals; rest before and after; variety and temperature of the food.

VALUE OF SOME OF THE STANDARD FOODS.

In 100 grams of	Protein.	Fat.	Carbohydrate.	Calories, approximate.
Beef, mutton, fish, fowl	20 gm.	5 to 10 gm.		125 to 170
Ham	20 gm.	25 gm.		305
Bacon	12 gm.	50 gm.		500
1 egg (50 grams without shell)	6.5 gm.	5 gm.		75
Milk	3 gm.	4 gm.	5 gm.	70
Cream, very thick	3 gm.	40 gm.	3 gm.	385
Cream, good	3 gm.	20 gm.	3 gm.	200
Butter	1 gm.	85 gm.		780
Cheese	25 gm.	33 gm.	2 gm.	400
Bread	9 gm.	1 gm.	60 gm.	275
Wheat flour	12 gm.		75 gm.	350
Oatmeal	16 gm.	7 gm.	66 gm.	390
Rice	8 gm.		80 gm.	350
Potato	2 gm.		20 gm.	90

From the above list a diet may be chosen for any condition where proteins or carbohydrates are not restricted.

Articles of food which contain no carbohydrates and which could be used in

A STRICT DIABETIC DIET.

Meat, poultry, game, fish, clear soups, gelatin, eggs, butter, olive oil, tea, and coffee—and for a variety, tongue, sweetbreads, tripe, kidneys, pigs' feet, brains, bone-marrow, anchovies, caviar, lobster, crabs, sardines, shrimp, smoked or pickled meat or fish.

Bread and puddings of gluten flour or gelatin flavored with lemon and sweetened with saccharin; walnuts, almonds, and pecans are allowable. All kinds of natural or artificial carbonated waters, with or without lemon and saccharin. Whisky, brandy, and light wines.

Patients cannot be kept on a "strict diet" indefinitely. The quantity of carbohydrates usually prescribed can be calculated from the diet chart. A tolerance of carbohydrate food must first be established. It is estimated by keeping a strict daily weight of the patient and the amount of carbohydrates ingested. From the amount taken is subtracted the amount of sugar thrown off in the urine during the twenty-four hours. The difference shows the quantity assimilated as a food.

The amounts of carbohydrate in the foods most commonly use are as follows:

Thick cream, ½ pint (240 c.c.) . .	6 gm. carbohydrate
Oatmeal, 1 gill dry (36 gm.) . .	24 gm. carbohydrate
Small orange or grape fruit . . .	10 gm. carbohydrate
Potato, 2 ounces (60 gm.) . . .	12 gm. carbohydrate
Bread, 1 ounce (30 gm.) . . .	18 gm. carbohydrate

PERCENTAGE OF CARBOHYDRATES.

5 per cent. or less.	6 per cent. or less.
Lettuce.	Cabbage.
Spinach.	Oysters.
Celery.	Radishes.
String beans.	
Tomatoes.	10 per cent. or over.
Rhubarb.	
Egg plant.	Onions.
Cauliflower.	Squash.
Asparagus.	Turnips.
Beet greens.	Carrots.
Cucumbers.	Beets.
Watercress.	Mushrooms.
Pickles (unsweetened and unspiced).	Oranges.
	Strawberries.
Clams.	Blackberries.
Ripe olives.	Peaches.
Scallops.	Watermelon.
Butternuts.	Muskmelon.
Fish roe.	Brazil nuts.

Butter, one-half ounce, should be served with each meal. All vegetables should be seasoned with butter, though it should be made as little obvious as possible.

One tablespoonful of olive oil should be taken daily, either on salad or clear; it may be taken before breakfast.

In nephritis the condition of the kidneys is the problem to be considered. The normal kidney excretes urea, water, and salts. In diseased conditions they are unable to do this; therefore in order not to throw work upon these organs, certain foods, the waste of which is eliminated by them, are restricted, namely, protein, salt, and water.

A milk diet is no longer considered the proper diet, because it contains such a large percentage of protein. In a quart there are about 35 grams. The three

quarts necessary for one day would contain 105 grams of protein, which is in excess of the ordinary amount taken under normal conditions.

A small amount of milk, possibly a quart, is allowable. Cream and milk-sugar should be substituted to make up the balance, where a liquid diet is essential.

In less acute conditions, the white meat of chicken, fat ham or bacon, raw oysters, clams, and fresh fish, boiled or broiled, onions, cauliflower, mushrooms, lettuce, spinach, celery, cabbage, rice, tapioca, and ripe fruits should be given sparingly.

Alcoholic beverages and quantities of meat, eggs, peas, and beans should be especially avoided.

As salt is also excreted in the urine, it becomes necessary to regulate the amount of salt by giving a salt-free diet or one in which the amount has been carefully regulated. This is particularly necessary if the patient has ascites or edema. Salt, having an affinity for water, holds water in the body. By the omission of salt a patient may loose ten pounds (of fluid) per week.

Water, always necessary, must be taken in very limited amounts.

Gout is caused by an excess of uric acid in the body and the difficulty of its excretion. It is the waste of broken-down animal cells not only those of our own bodies, but of the meat which we eat, consequently the omission of meat diminishes the uric acid by one-half.

The protein may be supplied by eggs, milk, vegetables, and cheese. An excessive amount of fat and

all forms of alcohol should be avoided. A fair amount of exercise should be taken daily.

In stomach trouble three things must be considered in choosing the diet: First, if there be too much or too little acid; secondly, if the stomach be irritable, and if the food leaves the stomach properly.

If there is too much acid, all foods which tend to stimulate the flow of gastric juice (acid secretion) should be omitted, such as beef tea, bouillon, clear soups, and highly seasoned food. Albumenous food, preferably eggs, should be substituted, as the albumen in the egg unites with the acid and renders it harmless. Fatty articles, as cream, butter, and olive oil, diminish the secretion.

The absence or diminution of acid may be remedied by giving those foods which stimulate the secretion of acid, as beef tea, clear soups, bouillon, and highly spiced and seasoned foods.

When the stomach becomes irritated upon taking an ordinary meal, a non-irritating diet should be chosen, which consists of (no alcohol) foods not highly seasoned and which disintegrate easily in the stomach; only a limited amount of salt should be partaken.

Cereals, bread (better toasted), eggs, macaroni, and simple puddings may be used in nearly all cases. In those less severe, white meat of chicken, beef, lamb (provided it is properly cooked and finely divided), rice, mashed potatoes, celery cooked soft, butter, cream, and a moderate amount of milk.

A cancer or ulcer may cause a partial obstruction,

and the food will not leave the stomach promptly. Finely divided, concentrated food should be used. Fat should be given freely and starchy foods which leave little residue. Fluids should be restricted, as they are likely to distend the stomach. To make up for the loss of fluid in the body, an enema of normal salt solution may be given, which will allay the thirst.

Constipation, to a certain extent, may be relieved by regulating the diet and omitting all constipating foods, such as milk, eggs, cheese, white bread, also any food which leaves a large amount of residue. In the morning before breakfast a glass of water or an orange may be taken; honey also helps. At noon a simple salad, celery, cucumbers, lettuce, or chopped cabbage; cooked fruit, as a baked apple or pear; stewed prunes, apricots, or ripe, raw fruit.

A mixed diet, with a variety of vegetables and always a large amount of water, is essential.

Diarrhea is caused by irritation of the intestines, brought about by some food (usually protein or fat), or by the presence of bacteria, possibly causing fermentation or decomposition of the intestinal contents.

The irritating food should be omitted. The surest method is to omit all food for forty-eight hours or more when possible. It is often necessary to keep up the nourishment. Such foods as milk and lime water, or milk with rice cooked very soft, tapioca, cornstarch, and a small amount of tea or coffee. After the acute stage, chicken or beef may be prescribed. A complete change of food often effects a cure.

In the various febrile diseases the diet must be regulated according to existing conditions, always keeping in mind the necessity for a certain amount of protein.

To prevent excessive waste, easily digested, non-irritating, concentrated food should be given, the main object being to afford as great a variety as possible.

The custom of giving milk only to fever patients, under general conditions, is almost obsolete. While milk contains all the elements necessary to sustain life, and has been termed a "perfect food," it also contains 87.6 per cent. of water and leaves considerable residue.

Patients are likely to become tired of it, though an occasional glass of milk is beneficial. It should not be given so often that the patient gets tired of it, as one may if it be given every few hours.

Cream may be substituted, in a measure, and is of high value as a food. It may be taken in oyster broth or clam broth. Two or three ounces flavored with weak tea or coffee, and one or two lumps of sugar, makes a pleasant change; besides, the sugar affords considerable nourishment, as one lump is equal to the white of one egg in value.

Cocoa, beef, mutton, and chicken broth afford variety.

Eggs in the form of albumen water, egg-nog, or egg lemon or orangeade, and a soft dropped egg, custard, and ice-cream also may be used.

In certain conditions a half-ounce of olive oil may be given morning and night. It should be ice cold,

and should be given with the medicines, so that it will not be overlooked.

Less severe conditions, soft solids, such as milk toast, cereals, tapioca, rice, junket, and gelatin flavored with fruit juice or wines may be allowed.

It has been found that typhoid patients who have been fed small amounts of concentrated food frequently and been given plenty of fresh, cold water to drink, have made a much shorter convalesence and are considerably less emaciated than with the old method of feeding.

There are conditions when this method of feeding must be modified somewhat, but the rule to prevent excessive waste holds good.

In cases of nausea or vomiting it is best to omit all feeding by mouth and feed by the rectum, if necessary, thus allowing the stomach to rest and adjust itself.

A teaspoonful of iced champagne may then be given every two hours for a number of hours. If it is retained, toast water, albumen water, or buttermilk may be given by teaspoonfuls every four hours, gradually shortening the time and increasing the amount until a greater variety of food may be allowed.

FORCED FEEDING.

In feeding patients who are unable to swallow, as is sometimes the case in diphtheria, or hysterical patients who refuse food, it may be necessary to resort to forced feeding. The food usually consists of milk,

eggs, beef juice, and sometimes brandy or whisky. It should be prepared in a pitcher and heated to 100° F.

A stomach or nasal tube should be boiled, connected with a glass funnel, and carried to the bedside on a tray with the pitcher, the whole neatly covered with a napkin.

A mouth gag is necessary if the stomach tube is used. The tube should be moistened and passed quickly into the stomach. Before pouring in the food sufficient time should elapse to be certain that the tube is in the stomach, not in the air passages. The tube should be removed quickly to guard against regurgitation.

Infant Feeding and Artificial Food.—Many infants die yearly from improper feeding—not lack of food, but poor and particularly unclean food.

Some of the indications for artificial feeding are a diseased mother, poor quality or an insufficient amount of maternal milk, or the separation of mother and child. This is possibly the most frequent reason for resorting to artificial food.

As a substitute for mother's milk it has been proved that cow's milk is the best, not as it is drawn from the cow, but so modified that in composition it is practically the same as maternal milk. In this age of pure food, dairy inspection, etc., it is possible to obtain fairly clean milk from a healthy herd, which is always better than that from a single cow.

The difference in composition is: Maternal milk, 3.8 to 4 per cent. fat, 6 per cent. sugar, 2 to 2.5 per cent. protein; cow's milk, 3.7 to 4 per cent. fat, 4.5 per cent.

sugar, 4 per cent. protein. Maternal milk is alkaline; cow's milk is neutral or acid.

The manner of modifying milk is to separate it, then recombine it according to a specified formula.

The milk should be cooled at a temperature of about 40° F., and allowed to stand undisturbed for eight or ten hours for the cream to rise. The upper one-third will then be approximately 10 per cent. fat, or the upper one-half 7 per cent. fat. Either may be used.

The 10 per cent. fat is 3 per cent. fat to 1 per cent. protein.

The 7 per cent. fat is 2 per cent. fat to 1 per cent. protein.

The sugar—1 part of milk-sugar to 20 parts of the mixture, or 1 ounce to 20 ounces. Lime water, 1 part to 20 of mixture or 1 ounce to 20 ounces.

FORMULÆ FOR TWENTY OUNCES.

Milk sugar, 1 oz. Lime water, 1 oz. Boiled water, q. s. ad 20 oz.	With 10% cream.	Formulæ. Fat.	Sugar.	Protein.
" q. s. ad 20 oz.	4 oz. =	2%	6%	66%
" q. s. ad 20 oz.	5 oz. =	2.5%	6.0%	83%
" q. s. ad 20 oz.	6 oz. =	3.0%	6.0%	1.00%
" q. s. ad 20 oz.	7 oz. =	3.5%	6.5%	1.16%
" q. s. ad 20 oz.	8 oz. =	4.0%	7.0%	1.33%

Dissolve the milk-sugar in hot water, add sufficient 10 per cent. cream, lime water, and boiled water to make the desired amount.

Divide into portions necessary for each feeding and put in separate bottles. Close the mouth of the bottle with non-absorbent cotton and do not open until used.

To sterilize milk it must be brought to the boiling-point, which changes the nature of the food to such an extent that it is not considered good for babies—hence the custom of pasteurization.

Heat to 170° F. and keep at that temperature for twenty minutes, then cool rapidly on ice. About 99 per cent. of all bacteria are killed by this process, but the milk will not remain good for a great length of time, and ought to be used in forty-eight hours.

Rubber nipples should be boiled for each feeding, and not allowed to stand in a cup of water or any solution.

When the child appears to be hungry after the regular feeding, the *value* and the *amount* should be increased, and the same quantity given.

CHAPTER XIV.

WOUNDS.

Classification and Method of Healing.

A WOUND is an injury or separation of any tissue of the body induced by violence either direct or indirect.

They are classified according to the nature of the injury.

Incised wounds are those with smooth parallel edges, which may be made with a sharp instrument, glass, etc.; but usually with a surgeon's knife.

Punctured wounds also have smooth edges, but the depth greatly exceeds the extent of injury on the surface. A stab wound is a good example of a punctured wound. If a punctured wound extends to any cavity of the body, it is usually referred to as a penetrated wound.

Contusions are injuries to the tissues under the skin, resulting in the rupture of small vessels and the escape of blood into the cell spaces. A contused wound is irregular, with crushed and bruised edges.

Lacerated wounds are those in which the edges are irregular and torn; there may also be a loss of tissue.

The immediate complications of wounds are hemorrhage and loss of function. Loss of function may be the result of a division of muscles, tendons, or nerves.

Secondary complications are due to infection, in which there must always be a period of incubation followed by inflammation and probably suppuration and loss of tissue, or general blood infection.

Wounds heal by:

1. **Primary Union or First Intention.**—A clean, incised wound the edges of which are held together is repaired very rapidly. The edges are joined by connective tissue and a thin white scar is formed. The process usually takes about eight days.

2. **By Granulation or Second Intention.**—The process of repair is slower, as new cells must fill up the space made by destruction of tissue. These new cells grow from the bottom and sides of the wound, the epithelium eventually covering their surface.

3. Repair of a superficial wound is by the formation of a crust, or scab over the surface, forming a protection while the healing process is going on underneath.

INFLAMMATION.

Inflammation is nature's response to injury, and is the first step in the process of repair. It is associated with heat, redness, pain, and swelling.

First the bloodvessels dilate, bringing more blood to the part, or causing congestion, which gives rise to an extra amount of heat and redness. Next there is the transudation of the blood plasma and the migration of the white cells into the cell spaces, forming the exudation fluid, which is always present when tissues are injured.

This results in swelling. The pressure on the nerves, brought about by this condition, causes the pain.

Whenever there is injury to any tissue, this phenomenon takes place. If there be no infection the inflammation subsides and the healing process continues rapidly.

Any wound, however simple, may be complicated by infection and the healing process greatly delayed by the destruction of tissue, the formation of an abscess or phlegmon, by blood intoxication or blood infection, with the ultimate result of loss of function, loss of the part, and possibly loss of life.

No wound, whether clean or otherwise, should be dressed without the utmost surgical cleanliness.

Any person who dresses an abscess, carbuncle, or infected wound without taking every precaution to guard against *further infection* is criminally negligent. Pus is no excuse for dirty fingers.

Hot, moist dressings are usually indicated for infected wounds. These should be of sterile gauze even when used with an antiseptic solution. It is a well-known though inexplainable fact that wounds of this class do better with moist heat than with dry, sterile dressings.

The ends to be met in the treatment of sepsis are:

1. To keep up the resistance of the tissues. (This is done by direct application of heat bringing more blood to the part.)
2. To prevent the further growth of organisms. (The use of antiseptics.)
3. To remove organisms. (Drainage.)
4. To counteract the effect of the toxins in the body.

CHAPTER XV.

BANDAGING.

Use of Splints, Slings, and Supports—Material Used—Methods of Application.

THE word bandage may be used as a noun, meaning a strip of material used to cover a wound, or as a verb.

To bandage, is to apply a bandage to any part of the body by successive turns.

Various materials are used, which are chosen according to their usage. They may be used for support, protection, pressure, or to keep a dressing or apparatus in place.

Plaster of Paris, or a cotton roller, which may be starched or used with a splint, is generally used for support.

When used for protection or to keep dressings in place, cotton rollers and muslin and gauze bandages are used. Gauze is to be preferred, as it is cool, comfortable, and easily adjusted.

Flannel bandages, both straight and cut bias, are used for pressure. Occasionally elastic rubber bandages are used for the same purpose, or to control the circulation, but they can only be left on for a short time.

Cotton rollers, starched or otherwise, are used for keeping splints, extensions or other apparatus in place.

A good bandage is one which fulfils its function, whatever that may be, without discomfort.

Bandages vary in size from $\frac{3}{4}$ of an inch wide and 3 yards long to 6 inches wide and 10 yards long, according to the part to which they are to be applied.

The principles of bandaging are few, and consist of several different turns: the circular, oblique spiral, reverse spiral, figure-of-eight, and recurrent.

By the combination of two or more of these any part of the body may be covered.

A *circular* bandage consists of circular turns, each one entirely covering its predecessor.

An *oblique spiral* consists of oblique turns, each successive turn applied above the preceding one, and overlapping it by two-thirds, can be applied to parts of equal diameter.

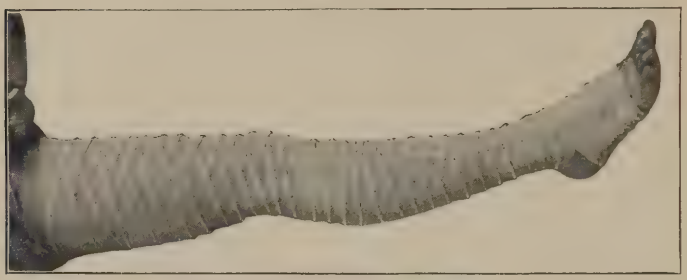
FIG. 9

Spiral reversed bandage of the upper extremity. (Wharton.)

The *reverse spiral* is applied to parts which gradually increase in diameter. The turns are oblique

and should lie flat to the surface of the part they cover. The upper edge of the bandage is reversed, or turned down at the median line; the upper edge becomes the lower, and should form a line which corresponds to that made by the lower edge.

Fig. 10



Spiral reversed bandage of the lower extremity. (Wharton.)

The *figure-of-eight* bandage may be used instead of the reverse bandage. It is also oblique, and consists of alternate turns, ascending and descending, which cross and form the figure-of-eight. This bandage is easily applied, and looks neat. It should only be used over a splint or some heavy dressing, as it does not fulfil one of the first principles. It never lies flat to the surface which it covers.

The *recurrent* bandage consists of successive folds carried back and forth over the part, and is held in place by circular turns, securing the ends. It is used principally to cover the head, stumps, the ends of fingers, etc.

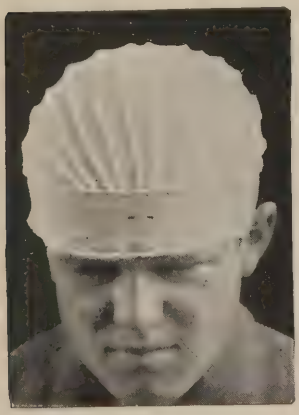
To adjust a bandage, begin at the smallest part,

and fix it by two or three circular turns; if it is a limb that is being bandaged, the bandaging should be

FIG. 11

Recurrent bandage of a stump. (Wharton.)

FIG. 12



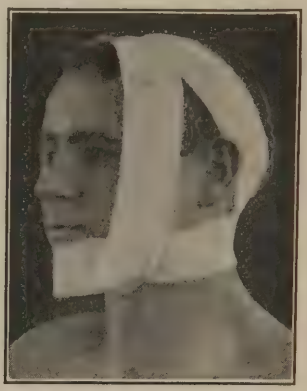
Recurrent bandage of the head. (Wharton.)

done toward the trunk, making spiral and reverse or figure-of-eight turns according to the shape of the part.

Fig. 13

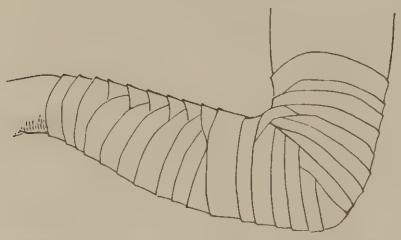
Crossed bandage of both eyes. (Wharton.)

Fig. 14



Barton's bandage. (Wharton.)

Fig. 15



Bandage of forearm and elbow (arm flexed).

A bandage for the hand is fixed at the wrist, then with oblique turns it should be carried down to the lowest point it is to cover, winding upward toward the wrist. The foot and ankle may be bandaged in the same manner.

Fig. 16

Demigauntlet bandage. (Wharton.)

Fig. 17

Spica bandage of the thumb. (Wharton.)

Fig. 18

Bandage of foot covering the heel. (Wharton.)

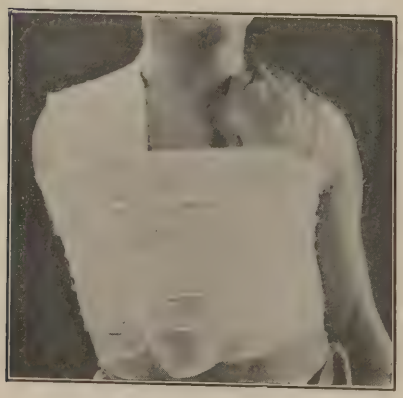
Fig. 19

Figure-of-eight bandage of the heel.

Fig. 20

Figure-of-eight bandage of the ankle.

Fig. 21



Velpeau's bandage. (Wharton.)

The essentials of a good bandage are:

1. That it must lie flat against the surface it covers.
2. That it must stay in place.
3. That it must not be too tight.
4. That it fulfils the purpose for which it is applied.

A many-tail bandage is made of cotton cloth cut to form an equal number of tails on each side. These are brought around the part to be covered and tied in a single knot, each successive pair of tails covering the ends of the preceding pair, the last ones being secured by a bow knot. Many-tail bandages are used when frequent changing of a dressing is necessary.

FIG. 22

Many-tail bandage.

The sling is a form of triangular or handkerchief bandage. It is used for support, and consists of a piece of cotton, one yard square, folded to form a triangle. The point of the triangle should be at the elbow, the folded edge reaching to the tips of the fingers. The outside of the sling should be carried across to the opposite shoulder, the ends tied about the neck, and the corner at the elbow turned in and pinned. Where immobilization is required a double sling may be used. The first is applied as described above. In the second

the folded edges at the waist are carried around the body and secured by pins under the arms. The point

FIG. 23

Sling.

FIG. 24

Second sling.

at the shoulder is turned in and fastened in the same manner. It should be firmly applied in the back, completely covering the scapula on the injured side.

FIG. 25

Double sling (back).

FIG. 26

Double sling applied (front).

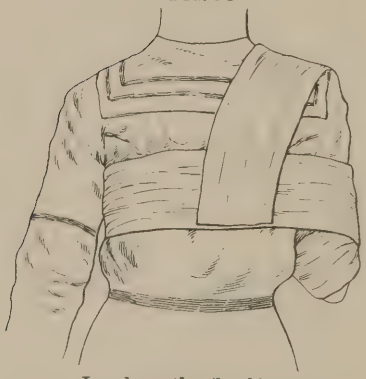
The Lund swathe affords efficient means of support and immobilization, and is particularly useful for

children. It is made according to the size of the patient. For an adult a piece of cotton cloth 3 yards long and 16 inches wide is necessary. Both edges should be

FIG. 27

Lund swathe (front).

FIG. 28

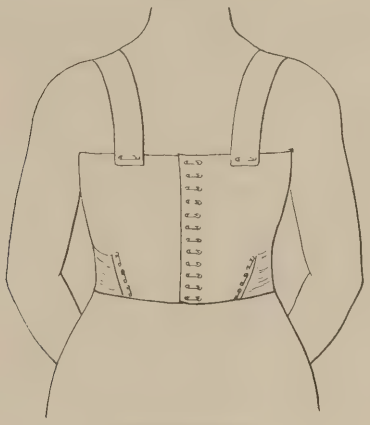


Lund swathe (back).

folded into the centre, then again folded through the centre, making, when finished, a swathe 4 inches wide and of four thicknesses.

To apply this kind of swathe, the hand of the injured side should be placed on the opposite shoulder. The first end is fastened about the injured arm half-way between the shoulder and elbow; the swathe is then carried across the back, under the arm on the opposite side, across the chest (over the arm and forearm), under the elbow from the outer side, up over the shoulder, and fastened in the back with safety pins.

FIG. 29



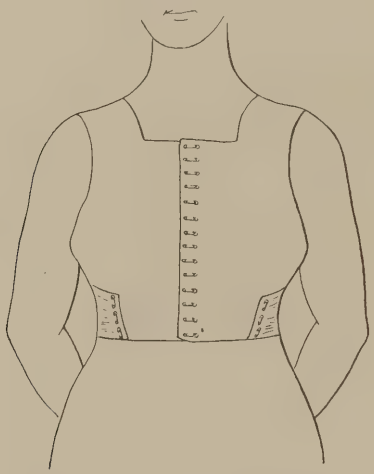
Straight swathe.

A swathe is a straight bandage made of two thicknesses of material, usually canton flannel or unbleached muslin. It may be used over the chest or abdomen to keep dressings in place or to restrict the movement in respiration.

An abdominal swathe varies in width from 14 to 18 inches, and should be long enough to pass around the body and fastened with pins.

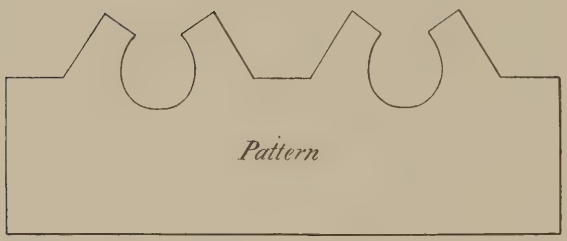
To adjust a swathe it is best to begin at the bottom and pin upward, making darts on either side, so that it may fit smoothly.

FIG. 30



Swathe with shoulder straps.

FIG. 31

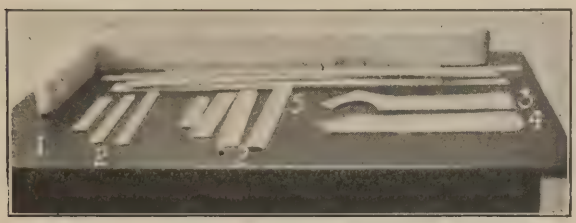


A chest swathe should extend from the axillæ to the lower border of the ribs, and should be held in place by shoulder straps.

SPLINTS.

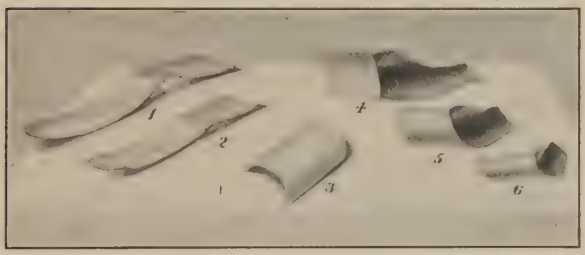
Splints are made of a rigid material, and are used for support, to immobilize, and to hold broken bones in place.

FIG. 32



1, T-splint; 2, coaptation splints; 3, anterior and (4) posterior splints for wrist; 5, splint wood.

FIG. 33



1, 2, ham splints; 3, shoulder cap (for fractured clavicle); 4, 5, 6, anterior angular splints (for fractured elbow).

A splint may be formed from a bandage, as plaster of Paris, or many thicknesses of starched crinolin.

Wood, tin, iron, wire, aluminum, felt, and water-board[1] also may be used.

[1] Water-board is a form of paper which may be soaked in warm water and moulded to fit the part to which it is to be applied.

Tin is possibly used more frequently than any other material, as it has the advantage of being less cumbersome.

Whatever material is used, a splint should be padded with non-absorbent cotton and smoothly covered. It should be long enough to immobilize the joint above and below the injury.

When a splint is to be applied, the skin should be washed with soap and water and bathed with alcohol.

Strips of adhesive plaster or webbing straps with buckles may be used to hold them in place. The circulation must not be restricted, but at the same time they must be so firmly adjusted that they will not slip and cause chafing.

STRAPPING.

Strapping with adhesive plaster is to immobilize to a certain extent while allowing partial use of the part. The chest is strapped for fracture of the ribs and to restrict the respiratory movement in pleurisy. Strapping is used to give support to the ankle, knee, or wrist in sprains or other injuries. The area to which adhesive straps are to be applied should be washed and shaved.

For the chest, the straps should be two inches wide and long enough to pass half around the body and across the sternum in front and the spinal column in the back. The strapping should begin at the bottom and one end fixed across the spinal column of the opposite side; the patient is directed to take a deep breath then to expel

the air while the chest is comparatively empty, draw the strap tightly around and fix the other end over the sternum. The second strap should overlap the first by one-third, and should first be fixed in front, then carried around to the back, and continued in this manner to the axilla. The ends are covered with a narrow strip to prevent rolling up.

For the knee, straps $1\frac{1}{4}$ inch wide and long enough to pass half around the leg are required. The first four should be applied nearest to the patella by fixing the outer end first and drawing each strap toward the centre, crossing the ends above and below the patella. Each strap should overlap the preceding one by one-third. A bandage is preferable for keeping the ends from rolling.

To Strap the Ankle.—Place the heel on a foot-rest, pass a strap or bandage back of the toes and allow the patient to hold the ends so that the foot will not drop downward. The straps of adhesive plaster are made one inch wide, and long enough to extend three or four inches above the ankle. The end on the inner side should be adjusted first; it should be drawn tightly under the heel and up on the outer side, passing just back of the malleoli. The second should be fixed just back of the big toe and brought around the heel to the little toe. Alternate straps are applied in this manner until the ankle is well covered, and finished with a narrow strap across the ends to prevent rolling up.

In cases where the ankle rolls inward, due to relaxed muscles or "flat-foot," the order of applying straps should be reversed, the first end should be fixed on the outer side and the straps drawn tightly inward.

CHAPTER XVI.

ANESTHESIA.

Preparation and After-care—Ether Bed—Preparation for Operation.

PREPARATION AND AFTER-CARE.

ANESTHESIA is loss of sensation, in whole or in part, due to a condition of the nerves, or brought about by the administration of drugs.

Drugs which produce loss of sensation are anesthetics, and are of two classes.

Local, those which are applied to an area and act by causing loss of sensation in that particular part, by paralyzing the nerve endings. Those most often used are cocaine and ethyl chloride.

General anesthetics act directly on the nerve centres and produce unconsciousness. Ether, chloroform, and nitrous oxide are most commonly used. The preparation for general anesthesia is the same, regardless of the agent used.

The stomach should contain no solid food. All food must be omitted for twelve hours, when possible; clear broth or black coffee may be given six hours before, then nothing but small amounts of water.

The night before taking an anesthetic a laxative

should be given and in the morning an enema of suds and glycerin, making sure that the rectum is empty.

The bladder should be emptied naturally if possible, otherwise by the catheter.

Particular attention should be given to the patient's mouth. The teeth must be thoroughly cleaned with a brush and peroxide or other antiseptic, the mouth washed out, and the throat gargled (when the patient is able to do so), as a routine, every four hours from the time the preparation begins until the patient goes to the etherizing-room. False teeth on plates must be removed.

During the period of unconsciousness, material from the mouth may be drawn into the air passages. If this has been rendered as free from bacteria as possible, the danger from pneumonia following anesthesia is greatly diminished. With proper preparation, pneumonia seldom occurs.

The patient should receive a full bath, special attention being given to the hair. If the patient be a woman, the hair should be parted and braided in two braids, and the braids pinned around the head. A cap should then be put on the head, covering all the hair, effectually keeping it out of the way of both the operator and anesthetist.

The After-care of Ether Patients.—During anesthesia the patient loses considerable body heat, consequently the bed should be well warmed. This is best done by using three stone heaters, which should be filled with water at a temperature of 125° F., covered with flannel covers, and put in the centre of the bed. When the

patient is returned, the heaters may be removed, or put outside *of at least one blanket* and away from the body, so that there will be no possibility of burning. This is necessary, as burns result much more easily than under normal conditions.

The patient must be placed in bed in a comfortable position, preferably on the side, with the head straight, resting well on the cheek, as a greatly flexed or extended head obstructs the breathing, and, being on the side, allows mucus and vomited material to drain from the mouth.

A pus basin, small pieces of gauze, and ether towels should be close by the bed.

In using pieces of gauze to wipe out the mouth they should be first moistened in cold water.

Careful watching is necessary to avoid choking or injury, which may result from extreme restlessness during a semiconscious state.

THE ETHER BED.

Considerable care should be exercised in the preparation of a bed for an ether patient. Fresh linen must always be used. Over the draw sheet a blanket should be placed, which should be tucked in at the sides; a rubber sheet, covered with a draw sheet at the head of the bed, should be so arranged that it will come down under the shoulders when the patient is in bed.

A pillow should not be placed under the head but pinned to the bed frame, so that it stands up, making

it impossible for the head to be pushed through the bars at the head of the bed.

A second blanket should be used to come next the patient, then the remainder of the bed clothing. This is to be tucked in at one side and folded back to the edge of the bed. The extra blanket covers the heaters, which are in the centre of the bed.

When a pillow is used, it should be a thin one, protected by a rubber pillow case.

PREPARATION FOR OPERATION.

The preparation of the field for operation varies according to the aseptic regime of the operator. The surface should always be scrubbed with soap and water and shaved, then scrubbed a second time and thoroughly cleaned with alcohol. A sterile dressing may then be put on which is not removed until the patient is on the operating table, when a supplementary preparation is made.

It is important that the area prepared should be large enough so that there will be no danger of the gloves or instruments of the surgeon being contaminated by coming in contact with parts not properly prepared.

CHAPTER XVII.

APPLICATIONS OF HEAT AND COLD.

Local—General, including Baths for Reduction of Temperature—Hot Packs—Hot Air Baths—Medicated Baths—Nauheim Bath.

APPLICATIONS OF HEAT.

Applications of heat are made so as to give added warmth to the body, relieve pain and bring more blood to the part.

When additional heat is desired, hot-water bags, frequently jugs, or cans may be used. These should be encased in a flannel cover and placed outside at least one blanket. The bags of rubber are the most comfortable, though they require filling much more often, and should be only about two-thirds full. The water which should be poured into them from a pitcher, should never exceed a temperature of 125° F. The air in the bag should be expelled by laying the bag flat so as to allow the water to come up to the mouth, then the stopper should be screwed in.

To relieve pain moist heat in the form of fomentation or poultices is effective.

The apparatus for fomentation consists of a piece of coarse flannel (two thicknesses of old blanket) wrung out of boiling water. To do this, a wringer is necessary. A wringer may be made of heavy crash

with a wide hem at each end, through which sticks are inserted. The wringing is done by twisting the sticks in opposite directions.

To make a fomentation, the flannel is placed in the wringer and dipped into a basin of boiling water and wrung out. The sticks are then pulled out and the wringer, with the flannel inside, is put between *heated* basins and carried to the bedside.

FIG. 34

Heated basins in which the fomentation is carried to the bedside.

The surface of the skin should be oiled and the hot flannel applied, covered with wax paper, and a second flannel or a layer of sheet wadding, which must be held in place by a swathe or many-tail bandage.

Turpentine stupes (or fomentations) are sometimes used. Mix equal parts of turpentine with sweet oil and apply (over the desired area) a thin coat with the fingers, over that the hot flannel, as described above.

The surface should be wiped dry and reoiled before making a second application.

A *poultice* is a soft, moist application of semisolid consistency and is to be used hot. Poultices may be made from any kind of meal, bread, crackers, etc. Flaxseed meal is generally used, as it is thought to retain the heat better than other materials. A piece of waxed or oiled paper should be cut the size of the poultice required, also a piece of muslin large enough

to leave a margin on all sides, and a piece of gauze to cover the whole. The water should be boiling, and the meal stirred in slowly.

Poultices should be made rather soft. When of the right consistency they are to be removed from the fire and beaten until light. No boiling is required after sufficient meal has been added, as it is apt to make it tough, heavy, and uncomfortable.

The mixture should be spread evenly on the waxed paper and the edges of the muslin folded over to form a margin. (This is necessary to keep the poultice from spilling out.) The entire surface of the poultice should be covered with gauze.

It should be carried to the bedside in heated basins, the skin oiled, the poultice applied and covered with sheet wadding. It should be kept in place with a swathe or bandage.

A poultice for the chest or abdomen should be made about a quarter of an inch thick, as any extra weight causes discomfort. For the face, neck, or limbs it may be made three-quarters of an inch thick without being uncomfortable.

Pain is relieved by dilating the superficial blood-vessels, by which congestion is lessened in deep-seated parts. When a poultice or fomentation is omitted, the part should be covered with a layer of sheet wadding.

Applications to the eyes should be made of circular pieces of flannel, about two inches in diameter.

It is necessary to have near the bed an alcohol lamp, tripod, and basin of water, which is kept at the required temperature (at least 125° to 130° F.). Into

this the pieces are dipped, wrung out, and put on the eye. They should be changed as often as they become the least cool, which may be every two minutes, or oftener, for they are exposed to the air and cool rapidly. They are used to relieve pain, swelling, and inflammation, consequently they should *be kept hot.*

In case of infected eyes the pieces of flannel must not be applied a second time, but thrown away and fresh ones used.

COLD APPLICATIONS.

Cold is applied locally to lessen congestion and relieve pain. It also retards suppuration and lowers temperature.

Iced compressors and rubber ice-bags of various shapes are in most common use. Ice-coils and ice-poultices are used occasionally.

To fill an ice-cap, collar, or bag, the ice should be crushed very finely, and the bag filled one-half or two-thirds full. The air is expelled by twisting the bag above the ice before screwing on the cover. For the chest or abdomen it should be put into a flannel cover. A cotton cover is used for other parts of the body.

Ice-coils are sometimes used because they are lighter. They consist of coiled rubber tubing. Two long ends serve to siphon the water from one receptacle, which is placed on a stand by the patient, through the coil into a second receptacle, which stands on the floor. The upper end of the tube may be supplemented by

attaching a bulb syringe, which may be left on, to start the flow of water at any time. This is convenient when the tube becomes clogged, as it often does.

Iced compressors are made of old cotton cloth, cut the required size, wet, and laid on ice until cold, then applied. The mistake should not be made of using several thicknesses, thinking thereby to save time and labor. They will keep moist, but they will also become very warm. Instead of an iced application it is warm, and partakes somewhat of the nature of a poultice.

In some cases the continued use of ice is accompanied by considerable danger. The pain may be relieved, while a destructive or suppurative process is going on unnoticed, because the patient is comfortable. This is particularly true in the use of ice for earache.

The application of extreme cold should not be made without the sanction of the physician, and unless the patient can be carefully watched.

General Applications of Cold.—The general application of cold is usually in the form of a bath, which may be given in the tub, or by sponging in bed, by spraying or showering, and by packs.

The degree of coldness should depend upon the condition of the patient: his circulation, degree of temperature, and susceptibility to antithermic treatment.

Baths for the reduction of temperature should be given in such a way that they not only abstract heat from the body, but also lessen the heat production. This result is best obtained by means of friction; by

this method the superficial vessels are dilated and the active movement of the blood is maintained.

Cool rather than cold bathing is, as a rule, the more effective, as the reaction which often results in heat production rather than heat elimination is lessened, also the possibility of shock from extreme cold is eliminated. The essential point is to have the water of the bath several degrees lower than the temperature of the patient and to maintain that degree all through the bath; or it may be gradually decreased according to existing conditions. 95° F. is a safe degree to maintain, or it may be gradually reduced to 85° F. without ill effects. In either case the bath should be continued long enough to produce a decided effect upon the temperature of the patient, twenty minutes or half an hour at least.

The length of the bath, rather than an excessively cold one, is of vast importance in the reduction of temperature. It is also essential that it should not cause any degree of exhaustion, consequently it is best given in the form of a sponge bath in bed.

To prepare for a sponge bath, first protect the bed with a rubber sheet covered with a wool blanket, upon which the patient is to lie. Have at the bedside water at the required temperature (92° to 95° F.); a bath thermometer should stand in the water, so that the degree of temperature may at all times be watched; a basin with a piece of ice, upon which the sponges are to be cooled; an ice-cap for the head; a heater well covered, to use in case of necessity (if the patient shivers, if the extremities become cold, and if there is

pallor or cyanosis); two towels and several sponges[1] are also necessary.

A towel should be folded diagonally, wetted, and laid across the abdomen, and the corners tucked between the thighs.

Pieces of gauze (or a sponge prepared for the purpose) should be wetted and placed around the neck, also one in each hand and in the axillæ.

The face should be bathed first, the sponges to be cooled on the ice before they are returned to the bath water; then with a sponge in each hand the attendant should begin at the feet and with one long sweep, sponge *up* the legs and arms and down across the chest, making the sponges follow the course of the venous return.

Sufficient friction should be made to keep the body a pink color. If the skin suddenly becomes pale or blue the bathing should cease.

Towels and sponges should be changed frequently, first cooling them on the ice before they are returned to the water.

The patient should be bathed first while lying on the back, then turned on the side so that the back can be bathed.

The bath should continue at least twenty minutes. He should then be covered with a dry blanket and allowed to rest one-half hour. The water should be allowed to evaporate from the surface of the body, but not dried with a towel.

[1] Sponges should be made of several thicknesses of gauze, sewed together, and kept for bathing only.

The good results in the order of their importance are equalization of the circulation, and the consequent lowering of body temperature, allaying nervousness and producing sleep.

Alcohol baths may be given in the same manner. The alcohol should be diluted 50 per cent. by the addition of water sufficiently warm to bring the temperature up to 95° F.

Whatever method is used, cold baths for reduction of the temperature should always be accompanied by friction.

FIG. 35

Method of applying sheet in a cold pack.

THE COLD PACK.

The bed should be protected with a rubber sheet. Two sheets wrung out of water of the required temperature should be placed one under and one over the patient, care being used to allow no two surfaces of the

skin to come together. An ice-cap should be applied to the head. It is seldom necessary to have a heater for the feet. When one is used it should be only moderately warm (about 110° F.).

The patient should remain in the wet sheets, which should be exposed to the air for twenty minutes, and if evaporation takes place so rapidly that they become dry, they should be sprinkled or wetted a second time.

After a rest of one-half hour between dry blankets, a bed-gown may be put on and the temperature taken.

THE HOT PACK.

The bed should be protected as for a sponge bath. The patient should lie on a dry blanket. One large wool blanket (or two if the blankets are small) should be wrung out of water at a temperature of not less than 160° F. This should be done with a wringer so that the blankets will not drip, and carried to the bedside in a covered pail.

The patient should be turned on the side and the wet blanket slipped under him and brought around the whole body, being careful that it is well tucked in around the neck. The dry blanket is then brought up over the wet one and securely pinned. Several dry blankets are put over all. Heaters should be put to the feet also one on either side. They should be filled with water not over 110° F., well protected and placed outside at least one dry blanket, making

sure that they are far enough away from the patient that burning cannot occur.

An ice-cap should be kept on the head and cold water given frequently (about four ounces every ten minutes) during the pack, which should continue from twenty minutes to a half hour.

When removed from the wet blankets, it should be done with the least possible exposure, and the patient left in warm, dry blankets for a half hour; then he should be rubbed dry with a bath towel.

The effect is to communicate heat to the body, promote heat production, and decrease heat elimination. The temperature and pulse are increased, and when prolonged for twenty minutes or a half hour, profuse sweating occurs.

Hot packs are valuable in Bright's disease, acute nephritis, which so frequently complicates the infectious diseases, edema, uremic coma, albuminuria, and eclampsia of pregnant women.

Hot air baths are given for any of the above conditions, though much less frequently than hot packs.

The bed should be prepared as for a pack, and the patient securely pinned in a blanket; two cradles are placed over the patient, one over the chest and the other over the legs; these should be covered with rubber blankets, making a rubber-lined tent in which the patient lies; blankets which come closely about the neck of the patient are then securely tucked in on the sides. An open space should be left at the foot, through which is passed the funnel of the hot air apparatus.

An ice-cap should be kept on the head and frequent drinks of cold water given. If pallor or cyanosis occurs the treatment should be discontinued.

A thermometer may be placed under the canopy to register the temperature of the bath, which should not exceed 120° F.

Patients should never be left alone while having a hot pack or hot air bath. A hypodermic syringe and stimulants of various kinds should be at hand ready for use in case of emergency.

Hot packs may be supplemented by hot air when prolonged moist heat is desired.

There are many forms of medicated baths given under varying conditions, as the bran bath, used in skin disease, the saline, bicarbonate of soda, etc.

THE NAUHEIM BATH.

The Nauheim bath is of most importance. It is an effervescent bath given at the famous resort, Nauheim, Germany, from which it receives its name. It consists of a full bath of the natural mineral water, which is charged with carbonic acid gas, and contains a large amount of calcium chloride in solution.

Its effect is to stimulate the superficial circulation to a high degree. In this way deep-seated congestion is relieved and the work of the heart considerably lessened. The action of the skin is also increased, lessening the work of the kidneys.

In this respect the Nauheim bath, at the tempera-

ture of the body, has the same effect as a hot bath, and the extreme temperature is avoided. This is important in cases of weak heart and in chronic nephritis.

This bath given by a skilled person produces excellent results. It may be used in cardiac conditions when there is dilatation and dropsy, and also in nephritis. The dropsy gradually disappears and the heart's action is improved.

The baths are usually given on alternate days until three or four have been given, then not for two or three days; they may be gradually increased in number until four are given on successive days. The patient should not be allowed to get exhausted. In heart disease the breathing should be normal when the patient is put in the bath. Friction must be used. The patient should never be left alone.

Artificial Nauheim salts, in packages with directions for using, can be procured from most druggists.

Inexperienced or unskilled persons should never undertake to give a Nauheim bath unless supervised by a physician.

CHAPTER XVIII.

COUNTER-IRRITANTS.

Their Use and Method of Application.

Irritants are substances which, applied to the skin, produce vascular excitement, dilating superficial vessels, producing inflammation or vesication. When used to excite reflex influence on a remote part they are called counter-irritants.

Counter-irritants act indirectly by dilating the vessels in the part to which they are applied, thus diminishing congestion and pressure and relieving pain. They are only applied directly over the painful area when absorption of the inflammatory products is desired.

There are three distinct classes or degrees of irritation.

Rubefacient, or first degree, irritation produced by mustard, iodine, turpentine, and various liniments causes redness of the skin (a superficial congestion).

Turpentine is used in the form of a stupe. (Described under Hot Applications.)

Tincture of iodine is applied with a camel's hair brush or swab of cotton. If the first coat does not produce sufficient irritation, it should be allowed to dry before applying a second time. Care must be

taken to make the application evenly. It should never be used directly from the bottle, but a sufficient amount should be poured out and used from a glass.

If the skin be very sensitive and the discomfort unbearable, the iodine may be removed with ether or alcohol.

Mustard may be used as a foot bath with hot water, and as a poultice or paste; also in the form of mustard leaves.

Mustard poultice is made of one part of mustard to four to six parts of flaxseed meal: the proportion depends upon the age of the person, the sensibility of the skin, and the degree of irritation desired, whether a redness or an inflammation of the skin.

Mix the mustard and flaxseed thoroughly, crushing all lumps. To this add warm water to make the right consistency, stirring constantly. The water should not be too hot, as the volatile oil, which is the irritating property, is driven off in the steam. Beat the mixture to make it light and spread on waxed paper, placing over the back a piece of muslin, with the edges turned down over the poultice to form a margin; the face of the poultice (the surface to be applied to the skin) should be covered with gauze.

Mustard paste is made in the same proportions, flour being used instead of flaxseed meal. It is more irritating, probably because the flour lacks the oil of the flaxseed. A layer of muslin instead of gauze should be placed over the face of a mustard paste.

The surface of the body to which the paste is to be applied should be oiled, to prevent blistering.

It must be removed when the desired degree of irritation has been attained. Fifteen to twenty minutes is usually a sufficient length of time.

Liniments are applied to the skin with friction; they are mild irritants, and give a feeling of warmth.

Vesicants, or second degree irritation, cause inflammation and a separation of the epidermis from the true skin, with the exudation of serum between, forming blisters. They may be produced by a second or third coat of iodine; by the prolonged application of mustard poultice or paste or by increasing the proportion of mustard in either; by the saturation of a piece of lint with turpentine, chloroform, or ammonia and immediately excluding the air; and by the use of cantharides, either as a plaster or in collodion.

When cantharides plaster is used the face of the plaster must be oiled, two slits cut to allow the blister to form, and fastened on with narrow strips of adhesive plaster. In applying cantharides plaster to any area, a series of small squares, not exceeding $1\frac{1}{4}$ inches should be used, and placed at least one inch apart.

This should be done so that the healing process may be hastened when there is no longer need of irritation. A blister three inches square may take weeks to heal, especially if the condition of the patient is poor, while the same area broken up into a series of small ones heals quickly.

When the plaster is fresh, a blister forms in from six to eight hours. It can be watched easily, as the slits cut in the plaster allow it to swell. If thoroughly

oiled there is no danger of breaking the skin when it is removed.

Usually the blister is opened and dressed with ointment, cold cream, or vaselin. With a pair of pointed scissors, which have been sterilized, a small cut should be made at the edge of the blister and the escaping fluid caught on a piece of sterile cotton or gauze.

Cantharides should not be used if the patient has any kidney trouble, as it is a direct irritant to the kidneys.

Acute nephritis has been known to develop in persons who were susceptible to the drug.

CUPPING.

Dry cupping when applied a short time produces first degree irritation. Dry cups are of most value in congestion of the lungs due to poor heart action. The difficult breathing which is the result of this congestion is greatly relieved. A sufficient number should be applied to cover nearly the surface of the chest. When the last one has been applied the first one should be removed and reapplied in a different spot. This may be continued for any length of time; a dry cup must not be allowed to stay in any one spot over five minutes.

To apply dry cups, prepare the bed by protecting it with *all wool* blankets. One should be put under the patient's back to come up over the pillow and cover the patient's hair, and a second one to cover and protect the spread and top sheet. Wool does not burn

readily, and the danger of setting fire to the bed is avoided. A tray should contain several cupping glasses, or small tumblers which have a thick round edge may be used; spirit lamp; cup of alcohol; swabs;[1] extra cotton; matches; extra cup or basin for used swabs, etc.

Dip the swab in alcohol, light, and apply to the inside of the glass, invert and apply quickly, taking the precaution not to use more than just sufficient alcohol, so that it will not burn in the glass. Injury may be done by the heated edge of the glass or by burning alcohol dropping on the skin.

To remove the glass, pass the finger under one side and allow the air to enter.

Wet cupping is nearly obsolete. It consists of making several cuts through the skin and over them applying cups as described above. The skin should be prepared as for a surgical operation.

Leeches are seldom used except by the ophthalmic surgeons to relieve congestion and inflammation of the eye and to relieve and prevent discoloration after an injury. They are applied on the temple about one inch from the corner of the eye.

The skin should be washed with soap and water, then rinsed with alcohol, and lastly with sterile water. Leeches will not bite if the skin is not clean, neither do they like soap and alcohol. It may be necessary to prick the skin and draw a drop of blood to induce them to bite. Each one should be put in a test-tube

[1] Swabs may be made by winding a small piece of absorbent cotton about the end of a probe or applicator.

separately, the pointed end (which is the biting end) toward the mouth of the tube, and the test-tube inverted directly over the spot desired.

When full the leeches will drop off. They should never be detached roughly. When full they may then be dropped into a basin of salt and water, and when they empty themselves of the blood they should be returned to the box of earth in which they are kept.

CHAPTER XIX.

EMERGENCIES.

Hemorrhage—Syncope—Epilepsy—Hysteria—Poisoning—Lavage —Artificial Respiration.

HEMORRHAGE is the escape of blood from some part of the vascular system. It may be internal or external, and is usually caused by a wound (traumatic) or by a disease condition (spontaneous).

An injury may be accompanied by more or less bleeding, therefore, most hemorrhages are traumatic, and are serious in proportion to the amount of blood lost.

When the bleeding occurs from a superficial vessel it is easy to distinguish an arterial from a venous hemorrhage. The blood from an injured artery flows in jets, is bright red in color, and comes from the side of the wound nearest the heart. The blood from a vein is dark red in color, and flows in a steady stream, and comes from the distal end. If a deep-seated vessel is injured it is impossible to distinguish whether the blood is from a vein or an artery, because the blood wells out and fills the wound.

Capillary hemorrhage usually comes from a large, denuded area.

Hemorrhage may be checked or controlled (1) by

always, if possible, elevating the bleeding part, and (2) by applying pressure, either direct (at the bleeding-point) or along the course of the vessel.

Direct pressure may be made by packing the wound, by a pad tightly bandaged over it, or in extreme cases by making pressure with the fingers.

Indirect pressure may be made by placing a small pad over the bleeding vessel above the wound if it be an artery, below the wound if it be a vein, and by a tourniquet or Esmarch bandage.

Hemorrhage is sometimes checked by the application of heat, hot-water douching, or towels wrung out of hot water and applied with slight pressure. The latter is generally used in capillary hemorrhage. Also by the application of cold, in the form of ice, iced water, or ice-bags.

The surgeon generally uses torsion, which is done by twisting and crushing the end of a vessel, and ligation, which, of course, is the safe and sure way.

Astringents are used internally and externally. Ergot and adrenalin chloride are the most useful; ergot is given internally, and adrenalin may be used both internally and externally.

Styptics are seldom used, because of the danger of infection.

A hemorrhage from a large artery may cause death in a few minutes. Hemorrhage from a small artery will as surely cause death if not controlled.

Primary hemorrhage occurs at the time of the injury or operation. Secondary hemorrhage may occur at any time after the primary bleeding has been stopped;

it may be caused by the slipping of a ligature or sloughing.

In hemorrhage from internal parts the blood may not be expelled for some time, as in intestinal bleeding, or the bleeding from gastric ulcers, or it may be *entirely concealed* and the person bleed into his own body cavities. It is only by general symptoms that such a condition can be recognized. The symptoms are: A bluish-white pallor with blue circles under the eyes, blue lips, and finger tips. A weak, irregular, or rapid pulse, usually increasing in rate. Restlessness, increasing up to a certain point. Thirst. Air hunger. A falling temperature. The skin is usually cold. Shallow, sighing respirations.

In spontaneous hemorrhage from any part of the body, as the nose, throat, lungs, stomach, intestines, uterus, etc., it is necessary to keep the patient as quiet as possible, and in the recumbent position, so as to give the heart the least amount of work. If the hemorrhage has been severe, it often becomes necessary to supply the body with fluid, which may be done by means of a hypodermoclysis or intravenous injections of salt solution. This is not done until the bleeding has been controlled, as any increase in the blood-pressure prolongs the hemorrhage.

SYNCOPE.

Syncope or fainting is caused by anemia of the brain, induced by poor heart action. The symptoms

are pallor, unconsciousness, rapid or poor quality pulse, feeble respirations, and usually a moist skin.

The patient first feels weak, moisture appears on the face, vision becomes dim, and there is a sound as of running water or the wind blowing the leaves; then he gradually becomes unconscious and falls, not a hard fall, but he generally "wilts down;" if in a chair he may slip to the floor.

It may occur as a result of fright, the sight of blood, or an accident, upon hearing bad news, or because of the "close" atmosphere in a crowded room.

The patient must be placed in the recumbent position, and the head must be lower than the body, so that the blood, through gravity, may be assisted in circulating through the brain. All constricting bands must be loosened, especially about the neck and waist.

Plenty of fresh air must be allowed. Occasionally stimulants are needed.

A prolonged fainting fit is dangerous, because the centres located in the brain, and which control the functions of the body, cease to act when for a certain length of time they are deprived of blood.

EPILEPSY—HYSTERIA.

Epilepsy is a nervous disease characterized by convulsions. It is generally a chronic condition and progressive. There is usually a premonition of the seizure, but the convulsion follows so rapidly that the patient is seldom able to get into a position where he cannot injure himself.

First is the tonic spasm. The patient falls, the muscles become rigid, and because of this rigidity of the respiratory muscles, he becomes cyanotic, and at times almost black. This spasm may last from thirty to forty seconds, sometimes longer. Then the muscles relax and there is involuntary twitching of all the muscles of the body. After a short time, varying from one or two minutes to ten or more, the patient either sleeps or becomes comatose.

Serious injury is sometimes caused by a fall, deep burns, cuts, bruises, and even fracture of the skull may occur.

A patient suffering from epilepsy should be put in a position where the violent movements can do him no harm. A gag or towel may be used to prevent biting the tongue, and he should be watched carefully, but never restrained. It may become necessary to administer ether or chloroform to prevent physical exhaustion.

Hysteria somewhat resembles epilepsy. It is a nervous condition, and the convulsions closely resemble those caused by diseases of the brain. Unlike epilepsy the attacks never occur in the night; the movements are not involuntary, but rather studied; such as an effort to perform some act, like pulling the hair, feeling the collar, or beating the hands against anything with which they may come in contact. An hysterical patient never injures himself, either by falling or by any act during the attack. The skin does not change color.

POISONING.

Poisons are substances which taken into the body are destructive to health or life. They are classified according to their action.

Irritant poisons are those which irritate, corrode, or excoriate.

Narcotic poisons, are those which produce profound sleep or coma.

Irritants may be either acid or alkaline in reaction, and they may also be narcotic in their action.

Antidotes are agents which counteract poisons. Antidotal measures may be mechanical, chemical, or physiological. The object to be attained is to remove, to neutralize, and to counteract the effects on the body. As much as possible of the poison should be removed by emesis or with a stomach-tube, and the balance neutralized by giving the chemical antidote, which either produces a non-poisonous or insoluble compound in the stomach. The physiological antidote counteracts or antagonizes the effects of the poison in the system.

While the chemical antidote has no effect on poisons which have been absorbed, the entire antidotal treatment should be carried out, as it is impossible to determine just how much absorption has taken place.

Powerful poisons, as the alkaloids, require powerful antidotes, which should be carefully used, as there is danger of substituting one poison for another.

Emetics should not be given after corrosive poisons; lavage should be used instead.

Emetics in common use are warm water in large quantities alone, also salt and water, one teaspoonful of salt to a tumbler of water. Mustard and water may be used in the same proportions.

Warm soap-suds are usually effective. Ipecac, sulphate of zinc, tartar emetic, and apomorphine hypodermically.

There are a number of drugs in common use which are "cumulative" in action: that is, when given in continued doses they accumulate in the body, and symptoms of poisoning may result. Others may accumulate because they are given more rapidly than they can be eliminated, or because of an individual peculiarity which makes one more susceptible to the effect of drugs. It is important that these conditions be recognized (which may be classed as chronic pisoning) and the use of the drug discontinued.

Arsenic is "cumulative" in action. It is also an irritant and a narcotic. It is most frequently given in the form of Fowler's solution, and in combination with iron and strychnine or iron and quinine.

Signs of the accumulation of arsenic in the system are: edema and itching of the eyelids, particularly in the morning; slight diarrhea; nausea and possibly vomiting; feeble heart; dyspnea; skin eruptions; and albumin in the urine.

In full toxic doses (which may be in the form of arsenous acid, Paris green, or Rough on Rats), gastro-intestinal or cerebral symptoms may develop. The first are the most common: there is burning pain in the stomach and abdomen; vomiting of bloody mucus;

thirst; bloody stools; suppressed or bloody urine; rapid, feeble heart; cold breath; collapse; death from paralysis of the heart. In the cerebral form the profound coma, like that of opium, comes on suddenly without gastro-intestinal symptoms. The treatment, if vomiting has not occurred, is an emetic or the use of the stomach-tube. The antidote is hydrated iron with magnesia and demulcent drinks, like flaxseed tea or gum-arabic water. Stimulants should be used if necessary. The bladder must be emptied frequently to prevent reabsorption.

Digitalis is a cardiac tonic and vascular stimulant and is also a diuretic and emetic. In overdoses it irritates the mucous membranes, causing sneezing and severe gastric disturbances, nausea, vomiting, and purging, the discharge being a grass-green color. The heart's action becomes affected; the pulse is slow, and may possibly be irregular or intermittent. There is dizziness, also the appearance of vibrating fringes of color around objects.

In toxic doses the respiration is first slow, then becomes rapid and feeble; there is also cyanosis, coma, and convulsions. Death occurs by sudden paralysis of the heart.

The chemical antidote is tannic acid. The stomach should then be washed out, as the tannate is not inert. Aconite is the best physiological antidote for large doses, and opium to those of long-continued use.

Strychnine is "cumulative" in action. The first constitutional symptoms are restlessness, with slight twitching of the limbs and stiffness of the jaw; the

corners of the mouth are drawn up in an unmeaning smile.

After poisonous doses the symptoms come on rapidly with convulsions, the limbs are rigid, and the head is drawn backward until head and heels nearly meet. The arms are bent and the hands clenched; the jaw is the last to become rigid. The eyes are wide open and staring; the face is first pale and then becomes livid from asphyxia.

The spasms resemble tetanus and follow each other rapidly; the mind remains clear until the end. Death takes place in two to three hours from paralysis of the respiratory muscles.

Tannic acid is the chemical antidote; it should be followed by an emetic or stomach-tube.

Chloral and chloroform are the physiological antagonists. The treatment for strychnine poisoning must be carried out as soon as the drug has been taken, as it is rapidly absorbed and a delay of a few minutes may prove fatal.

Opium and morphine are *not* cumulative in their action, though symptoms of overdosing result when the interval between doses is not sufficient for its elimination to take place.

Signs of overdosing are nausea and vomiting, profuse sweating, depression of the heart action, pupils somewhat contracted, slow respirations, and sleep or stupor.

In poisonous doses there is a cold, clammy skin; slow heart action; lost reflexes; minutely contracted pupils; very slow respirations, possibly three or four per minute; coma; death by paralysis of respiration.

If narcotism comes on gradually after giving medicinal doses, the patient should be kept awake until the effects gradually disappear.

The treatment for opium or morphine poisoning consists in the evacuation of the stomach, maintaining respiration, and keeping up the circulation.

The chemical antidote is potassium permanganate, the dose of which should be one-half greater than the amount of morphine taken. When taken hypodermically, both the emetic and the chemical antidote may be omitted.

Atropine antagonizes its cerebral action, also action on the heart and respiration. Strong, black coffee by mouth or by rectum may be prescribed. Caffeine, strychnine, and cocaine also counteract morphine. The faradic current of electricity applied to the chest muscles and artificial respiration are of great value. The bladder should be emptied frequently to prevent reabsorption.

Mineral acids: hydrochloric, nitric, phosphoric, and sulphuric. The antidotes are alkalies, as soda bicarbonate, lime water, or soap-suds to neutralize the acid. The stomach should be emptied cautiously with a stomach-tube; stimulants may be given if necessary; also opium for the discomfort and demulcent drinks.

Carbolic acid: Wash out the stomach with 50 per cent. alcohol (whisky or brandy may be used). Having completely emptied the stomach, three or four ounces of a solution of 50 per cent. alcohol and water, with brandy or whisky, should be given by the stomach-tube and allowed to remain in the stomach.

Sulphate of magnesium or sodium are chemical

antidotes. After their use the stomach should be emptied by lavage, as it is impossible to produce emesis after the ingestion of carbolic acid. Either of the above methods may be used, but alcohol is usually given precedence.

Atropine is a physiological antagonist, and maintains the heart and respiration until elimination occurs, which should be promoted by giving drinks freely. Demulcents may be given to protect the mucous membrane, but no oils or glycerin. The bladder should be emptied frequently.

ALKALIES.

For poisoning by ammonia, caustic potash, etc., vegetable acids form the antidotes. Lemon juice, lime juice, and dilute vinegar may also be used. Milk or oil, and white of egg are of value. The stomach should be emptied cautiously. Plenty of fresh air is essential. Digitalis is an antagonist. Sedatives may be given if necessary.

Gases, illuminating, carbon dioxide: Fresh air, external heat, and stimulants if necessary, are the antidotes.

Mercury, bichloride, or corrosive sublimate: The external use of bichloride of mercury has been known to produce symptoms of poisoning. An eruption of small pimples appears. The gums and teeth become sore and salivation may follow.

For accidental poisoning by mercury, one egg to every four grains of the bichloride; more than this may redissolve the mercury.

Vomiting should be promptly induced and actively kept up for some time after giving the antidote.

The symptoms which accompany large doses of mercury are nausea, burning in the stomach, abdominal pain, and diarrhea. The urine is diminished, and may contain blood and albumin, or may be suppressed. In the course of a number of hours, or it may be days, there is collapse, syncope or convulsions, coma and death

LAVAGE.

Lavage is the washing out of the cavities of the body, usually the stomach. It is most often used in cases of poisoning to empty the stomach; it is also used as a therapeutic measure in acute or chronic gastritis, in excessive vomiting, and for the chemical analysis of the contents of the stomach.

Necessary Articles. Rubber dressing-sheets and towels to protect the patient and bed; a slop jar or some receptacle for the fluid and material washed out: a pitcher of sterile water; salt solution of whatever fluid is to be used, from two to four quarts, at body temperature.

The stomach-tube, funnel, and mouth-gag may be sterilized together and brought to the bedside covered. Patients who are conscious may sit up during the procedure. The head *should not* be thrown back, but held slightly forward. Those who are unconscious, delirious, or hysterical are placed on the back and the mouth-gag used.

The tube should be moistened and passed gently into the pharynx. If mentally responsible the patient should be instructed to swallow while the tube is being rapidly pushed into the stomach, the distance of which should have first been estimated.

Before pouring the fluid into the tube it is necessary to see that the patient breathes normally, that his color is good (not cyanotic), and that he does not cough. Any of these conditions may indicate that the tube is in the trachea, when it should, of course, be withdrawn. This is a precaution which should never be overlooked even in the gravest emergency.

About one pint of water or solution to be used should be poured into the funnel, then, while about half full the funnel must be quickly inverted into some receptacle which is lower than the level of the stomach, when the fluid poured in and the contents of the stomach will be siphoned out. This should be repeated until the fluid is returned clear.

ARTIFICIAL RESPIRATION.

Respiration is carried on by the contraction and relaxation of the respiratory muscles, by which inspiration and expiration are performed. By producing certain movements the same result is procured, that of creating greater space in the chest, which fills with air, and of forcing the air out.

There are several methods of performing artificial respiration. Sylvester's method is most commonly used,

which consists in first raising the shoulders slightly, the head being allowed to drop backward; the arms between the wrists and elbows should be grasped firmly and the arms swung horizontally away from the body until they meet over the head. This creates greater air space (inspiration), and should be performed slowly, to give the lungs a sufficient length of time to fill with air. The arms should then be brought down across the chest and pressure made against the chest wall, which expels the air (expiration).

Both movements should occupy at least three or four seconds, as not more than sixteen to twenty movements should be performed per minute.

CHAPTER XX.

EMERGENCIES (Continued).

Fractures—Sprains—Dislocations—Burns—Shock—Foreign Bodies in Eyes—Ears—Nose and Throat.

FRACTURES.

A FRACTURE is a break in a bone which may be complete or only a fissure. When classified according to the nature of the injury there are two distinct classes:

1. The open or compound fracture, when there is an external wound leading down to the seat of injury, usually caused by the sharp end of the bone being driven through the skin.

2. The closed fracture, of which there are several varieties.

(*a*) The simple fracture is a break in a bone without external wounds or complications.

(*b*) The comminuted fracture, in which the bone is shattered or broken in several places.

(*c*) The impacted fracture, in which the ends of the broken bone are driven together.

(*d*) The green-stick fracture—which is like a green stick splintered and broken while the fragments still hang together.

(*c*) The subperiosteal fracture—a fracture of the wrist in which the periosteum is not broken, often spoken of as the "chauffeur's wrist."

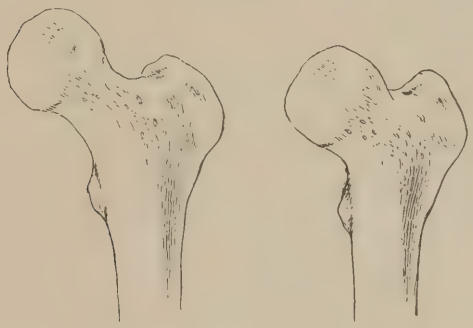
A depressed fracture is of the skull; it is only dangerous when both plates of the bone are broken.

In young persons the types most frequent are:

1. The green-stick, because of the excess of animal matter in young bones.

2. Separation of the epiphysis along the epiphyseal line. This is likely to occur up to the age of about sixteen years, or until the epiphysis has united with the shaft of the bone.

FIG. 36



Impacted fracture of the hip.

In the old, a not infrequent occurrence is impacted fracture of the hip, the head of the bone being driven into the cancellated portion.

The other types occur in both old and young, and the breaks may be transverse, oblique, or fissured.

Signs of fracture: Abnormal mobility at the seat of fracture. Pain always. Localized tenderness always. Swelling nearly always. Deformity usually; some breaks do not show deformity. Crepitus not always; when present, fracture is positive. In impacted hip and subperiosteal fractures it does not exist. Loss of function not always; impacted hip and lower end of fibula are exceptions. Discoloration usually, but may be hours or days after the injury. Blebs are apt to occur with the swelling.

Treatment.—First immobilize the part by using some temporary support until the swelling subsides. For a fracture of either bones of the leg, a pillow splint may be used, which consists of a soft pillow about the leg reinforced on either side by straight pieces of splint wood and held in place by two or three straps.

This permits the swelling without causing pressure or obstruction of circulation. Later the blebs should be opened with a sterile needle, to allow the fluid to come out, then dusted with an antiseptic powder, as boracic acid. Carelessness in caring for these blebs may result in infection.

A plaster cast is usually the permanent dressing for any fracture below the knee.

For fracture of the femur, the patient should be placed on a Bradford frame with sand bags until it is safe to use a Buck's extension. For a small child a crane may be used instead of the Buck's extension.

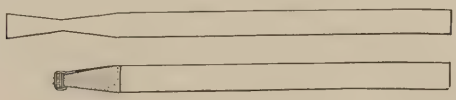
A fractured forearm may be put up in an anterior and posterior splint; as the sides are open there is room for the swelling.

In open or compound fractures the danger lies in infection, because there is always an infected wound. The outcome depends upon the amount of the infection and the virulence of the organism.

The patient is invariably anesthetized, the wound thoroughly cleansed with soap and water and antiseptic solutions. The bones are then put in apposition, and after the wound has been dressed a plaster cast applied. The plaster is applied at the first dressing of a compound fracture, because the draining of exudation fluid from the wound allows very slight if any swelling.

Later an opening, called a window, is cut in the cast so that the wound may be dressed.

FIG. 37



Extension straps.

In the first treatment of a fracture there is danger from the too tight application of a bandage, plaster, or adhesive straps. The improper application of either of the above may so obstruct the circulation that gangrene may result with amputation of the part following.

To prepare for a Buck's extension the leg should be thoroughly cleaned with soap and water and then shaved. An extension strap is applied to either side of the leg, which may be reinforced by strips of adhesive plaster applied spirally.

An extension strap consists of a piece of mole-skin plaster (which should come above the knee), to which a buckle is fitted; the end is then turned back and stitched, the non-adhesive side of the plaster serving as a facing for the strap.

A sheet-wadding bandage is placed over the strap, padding it well, and last a cotton muslin bandage, which has been starched, should be soaked in warm water and put on damp. This when dry makes a firm bandage, and one which will not slip. It also keeps clean much longer than the unstarched bandage. At the point of fracture, coaptation splints are applied and kept in place with straps, fastened with buckles.

A T-splint should extend from the foot to the axilla, and be kept in place by being strapped to the leg and the use of a pocket swathe. The extension straps are then fastened to a spreader and the required amount of weight put on. The foot of the bed should

FIG. 38

T-splint used with a Buck's extension.

be elevated with bed blocks, the bed making an inclined plain; the weight of the body serves for counter-traction. An unyielding surface is obtained by the use of the fracture board, and for convenience in moving, the patient should lie on a Bradford frame.

Articles needed for a Buck's extension are:
Sheet-wadding, 6 sheets.
Straps, with buckles, 6 to 10.
Safety pins.
Adhesive strips.
Sheet-wadding bandages.
Cotton muslin bandages (starched).
Coaptation splints.
T-splints.

Pocket swathe. A swathe with a pocket or straight piece sewed on the outside, through which the end of the splint is put.

Extension straps.
Spreader.
Extension pulley.
Weights.
Bed blocks.
Bradford frame.
Fracture board.
Cradle.

Extension for a Child.—When the child is from six months to twelve years a crane may be substituted for a Buck's extension.

The leg is treated as for an adult, then extension is made by passing the rope attached to the spreader, through a pulley fastened to the crane. Weights are attached to the free end of the rope.

The leg should be in an upright position; the weight of the body makes counter-traction. This is a simple apparatus and permits of considerable movement on

the part of the child without disturbing the position of the bones.

Fig. 39

Extension crane for a child.

PLASTER CAST.

A car or table should be at the side of the bed, upon which are placed rubber sheets to protect the bed and the floor. A doctor's rubber apron, sand bags, three for short plaster and five if the plaster is to extend above the knee. Sheet-wadding bandages, to be put on under the plaster; plaster bandages;

plaster of Paris, dry, in a basin; a flannel bandage or stockinette tubing to serve for a cuff. This is put on with the first layer of plaster; when the plaster has reached sufficient thickness, the cuff is turned back and fastened down by the last layer of the plaster bandage.

A receptacle of warm water sufficiently deep to allow the bandages to stand on end and still be covered with water.

If salt is added the plaster sets more quickly. The proportion is one teaspoonful to a pint of water, which should be put in a cup, to be used if desired.

The bandages should be soaked just before using and not allowed to stand in the water after it has ceased to bubble.

That the best results may be obtained, the patient is usually anesthetized when a fracture is put up permanently. When this is the case, an ether cone, ether towels, tongue forceps, and a pus basin are necessary.

Fractures may be complicated by sprains or dislocations when in the vicinity of a joint; by laceration of large bloodvessels; also in case of fracture of the ribs or of the pelvis, puncture or injury of the lungs, liver, spleen, kidneys, bladder, or the intestines.

SPRAINS.

A sprain is an excessive strain, laceration, or complete separation of a ligament from the bone at a joint without dislocation of that joint.

The ankle is most often involved. There is pain,

tenderness, swelling, and discoloration; the seriousness depends upon the extent of injury.

The first treatment required is to immerse the part in water as hot as can be borne until the first sharp pain subsides, then if the injury is not extensive the part should be strapped with adhesive plaster.

If the injury be to the ankle, the patient is instructed to walk as usual. It is found more difficult when the knee is involved, but even in such a case there should be exercise.

When there is separation of the ligament from the bone, the same treatment as for a fracture is indicated —complete rest and usually a plaster cast.

DISLOCATION.

A dislocation is the displacement of a bone at a joint. It may be partial, complete, or compound.

A compound dislocation is always a serious injury. The open wound, which is the result of the tearing apart of the soft tissues, results in an infected wound.

Signs of Dislocation.—Pain, deformity, loss of function, and later swelling and discoloration.

There is but little that a nurse can do other than to keep the part at rest and use hot applications. Lead water and laudanum may be applied hot in the form of a fomentation, to lessen the pain.

To reduce a dislocation, an anesthetic is necessary. The part should be immobilized and kept at rest for a few days, the length of time depending upon the extent of the injury.

BURNS.

Burns are among the most frequent emergencies. They are classified according to the extent of the injury into three degrees:

First degree—consists of injury to the epidermis, resulting in destruction and superficial inflammation.

Second degree—separation of the epidermis from the true skin with injury to the corium. The result is sloughing of the superficial tissue.

Third degree—injury and destruction of the deeper tissues, which may involve muscles, tendons, nerves, ligaments, and even the periosteum.

The mortality from burns depends upon the physical condition of the person and the character and locality of the burns; the chest and the abdomen.
are the most dangerous localities.

Old persons and children have low resistance and stand burns poorly.

There are two stages to be considered in the treatment of all extensive burns: First the shock, which is immediate and always present. Later sepsis, as there is always sloughing of tissue according to the degree of the injury.

The Immediate Treatment.—Shock should be treated first, then the burns should be dressed. Blebs may be opened with clean, sharp scissors.

It is generally admitted that picric acid gives better results than carron oil dressing, which has been so much used in the past.

Picric acid is not popular because it stains a bright yellow, leaving stains on the nails which will not disappear for months. It should be used in a 2 per cent. solution (saturated). It is an antiseptic, a deodorant, a stimulant, and an anodyne.

Gauze should be saturated and fluffed, not allowed to lie flat against the surface. It should be used because it permits of free drainage. After the daily dressing the gauze may be saturated two or three times during the twenty-four hours without removing from the wound.

After granulations appear, an ointment should be used. Boracic acid is highly efficient, and should be spread on material which does not have wide meshes.

Scarlet-red ointment stimulates the growth of epithelial cells. It should only be used sparingly, a thin layer around the edge of a granulating surface for one day, then skip at least for two days, otherwise the granulations become too exuberant.

In extensive burns a skin graft is nearly always necessary, as the epithelial tissue will not grow across a wide space.

It may become necessary to apply a splint, when new skin begins to grow, to prevent contracture and deformity from scar tissue.

Burns may be complicated in many ways, the most frequent of which is acute nephritis, induced by the extra work thrown on the kidneys as the direct result of injury to the sweat glands.

Pneumonia is a serious complication, and may occur if there has been any inhalation of smoke.

SHOCK.

Shock is a condition of prostration and low vitality. It usually follows accidents, injuries, and operations; it also may be brought about by any strong emotion, as fright or bad news.

Collapse is a term used to express a similar condition, generally more profound, and accompanying some disease rather than violence.

The signs of shock from any cause are:

Weak, rapid, or irregular pulse.

Subnormal temperature.

Pallor.

Skin cold and clammy. (Profuse perspiration usually covers the entire body.)

Respirations shallow and feeble.

Unconsciousness may or may not be present.

The first treatment is external heat, warm blankets, and heaters.

Stimulants given hypodermically if there be nausea, which may be present if the reflexes are not entirely lost, otherwise brandy or hot coffee by the mouth. In extreme cases rectal saline should be given constantly by the drop method,[1] and the foot of the bed elevated.

The symptoms of shock are not unlike those of hemorrhage, which is concealed.

In hemorrhage there is usually a marked increase in the pulse rate in a few minutes; the skin in hemorrhage is usually dry.

[1] Rectal saline is described under Enemata.

FOREIGN BODIES IN THE EYE, EAR, NOSE, AND THROAT.

A foreign body in the eye not only causes extreme discomfort but may set up a serious inflammation.

Bathing the eye should be tried first if the foreign substance is not embedded in the eyeball, as it will usually dislodge anything in the eye that is movable. When embedded in the lid, take the lashes of the upper lid between the finger and thumb and pull it down over the lower lid, at the same time instruct the patient to look down; hold a probe or any small, smooth stick across the centre of the upper lid and turn it back quickly. This exposes the inside of the upper lid, when any foreign body may be wiped away.

Sharp particles of sand, glass, or cinder may become embedded in the eye, when it is necessary to use an instrument, which should be done by a surgeon, usually under cocaine.

A foreign body in the ear that is likely to swell should be removed as soon as possible by an aurist. Removal should never be attempted by seeking for it with a probe, forceps, or hairpin.

Hard objects, like buttons, small pebbles, beads, etc., may be dislodged by irrigating the ear.

Beans, peas, or seeds of any kind swell when soaked in water; in such case irrigating is contra-indicated, and a skilled aural surgeon should be consulted.

For insects, first drop in a few drops of oil; they cannot breathe in oil, and soon the fluttering and buzzing,

which is so distressing, stops. Then lay the head down, the affected side up, and gently pour in warm water, when the insect with the oil will float out.

To remove a foreign body from the nose: Take a deep breath and fill the lungs with air, close the mouth and the other nostril and try to force the object out by blowing the nose. If it cannot be removed this way, it will require the services of a surgeon.

A foreign body in the throat may become lodged in the vocal cords. A blow between the shoulders sometimes will dislodge it. If the object be of considerable size, the fingers of one hand should be placed on the throat below the larynx, and the patient instructed to cough hard, at the same time the head must be pushed quickly forward, and pressure made upward with the fingers on the larynx; this will usually dislodge any obstruction that can be removed without surgical interference. In an emergency it is possible to remove an intubation tube by this method.

CHAPTER XXI.

Aspiration—Paracentesis—Lumbar Puncture—Hypodermoclysis and Intravenous Preparation and Method of Giving.

ASPIRATIONS.

Aspiration is withdrawing fluid from the body cavities by means of an aspirator.

Hydrothorax.—A collection of fluid in the pleural cavity is usually the result of pleurisy; it sometimes accompanies or follows pneumonia, and may occur during the early stage of tuberculosis.

To remove this fluid an aspirator is used, which consists of a large bottle to which is attached two tubes; on the end of one is the aspirating needle, on the other an exhaust pump, by which a vacuum is formed in the bottle. The needle is then inserted into the pleural cavity and the fluid withdrawn. The use of this apparatus prevents the entrance of air into the cavity.

The puncture is made through the posterior chest wall. When possible the patient should be allowed to sit up in bed, with the body and shoulders well forward, otherwise he may lie on the side.

The preparation consists of shaving and thoroughly scrubbing the part with green soap and water, then with alcohol or any disinfectant desired. The area should be protected with sterile gauze or a towel.

Articles needed:

1 blanket to cover the patient's shoulders.

1 dressing sheet.

1 tube of ethyl chloride.

1 culture tube.

1 finger bowl with green soap and water.

1 finger bowl with alcohol or some disinfectant solution.

1 kidney basin.

1 bottle collodion with camel's hair brush.

Sterile sponges.

Sterile cotton for collodion dressing.

Aspirating needles sterilized, covered, and brought to the bedside on a tray in the vessel in which they were boiled; they are not to be uncovered until used.

It is best in all cases to prepare an emergency tray, upon which should be a hypodermic syringe with needles sterilized and ready for use, and stimulants of various kinds, which are chosen according to individual needs.

Ascites.—A collection of fluid in the abdominal cavity may be caused by disease of the heart, liver, or kidneys; it may occur in tuberculous conditions. Cirrhosis of the liver is one of the most frequent causes. Whatever the cause, it results in obstruction to the circulation and the transudation of the fluid portion of the blood, which collects in the body cavities. To remove this fluid a cannula and trocar are generally used; occasionally a small incision is made before the cannula is inserted.

The patient is most comfortable sitting up and the

drainage is much better. The legs should be warmly covered and the back well supported.

The preparation is the same as for aspiration of the thorax and in addition is needed:

1 scalpel (if incision is made).

2 artery forceps (if incision is made).

1 pair of scissors (if incision is made).

Suture (if incision is made).

Sterile gauze.

Sponges.

Swathe.

Occasionally the wound is not sutured but left to drain. In such a case a tight swathe is of value.

In all cases there should be:

1 cannula and trocar.

Rubber tubing.

1 slop jar to contain the fluid.

The tubing may be attached to the cannula and arranged to drain into the slop jar, which should be on the floor beside the bed.

Aspiration of the Pericardium.—This operation becomes necessary when there is a collection of fluid in this cavity, usually due to inflammation of the membrane itself. The preparation and procedure is the same as for aspiration of the thorax. The operation is accompanied by great danger, and is seldom practised.

Lumbar Puncture.—A puncture into the lumbar region of the spinal canal to withdraw fluid which is the result of an inflammatory process of the membranes of the brain or spinal cord. The patient should lie on the side with the body bent well forward.

The preparation and procedure is the same as described above. The puncture is usually made with an aspirating needle or a specially designed trocar and cannula.

Any of these operations may be followed by more or less shock. In all cases it is well to prepare for emergency by having at hand a tray, which contains a hypodermic syringe and various stimulants.

HYPODERMOCLYSIS.

Hypodermoclysis is the forcing of large amounts of fluid into the cellular tissue to replace fluids lost (usually loss of blood).

It consists of normal salt solution, and varies in amount from one pint to two quarts. This is generally given under the breast (subpectorally), but it may be given in the soft tissues of the abdomen or below the shoulder-blade.

In postpartum hemorrhage the manipulation of the breast, necessary in giving "subpectoral saline," frequently results in mastitis later, which causes much discomfort. Not infrequently abscesses have occurred.

Preparation.—Saline at body temperature may be heated and kept at this degree by standing the flask in a pail of water, which is tested by a thermometer.

2 aspirating needles.

Rubber tubing (2 short pieces and 1 long piece).

Y-glass connecting tube, all of which should be sterilized and brought to the bedside covered.

When advisable to give more slowly, only one needle need be used

The surface should be prepared as for any minor surgical procedure and the puncture may be covered with a collodion dressing.

The flasks used for saline in hospitals are provided with rubber stoppers, through which are inserted two glass tubes; when in use one serves as a vent, to the other is fastened the rubber tubing with the needle attached; the flask is then inverted.

The solution should flow freely through the needle when it is inserted into the tissues. This excludes the possibility of introducing air.

Intravenous.—In an intravenous the fluid enters directly into the circulation. This method of introducing fluid into the body is accompanied by a certain amount of danger, and is used only in case of grave emergency.

One of the veins of the forearm is usually chosen because of its nearness to the surface. The area is prepared as for minor surgical operations.

Articles needed are:

Saline—body temperature.

Tubing.

Curved dropper.

1 scalpel.

2 rat-tooth forceps.

1 pair of scissors, curved, flat.

1 aneurysm needle or spear.

Ligatures.

Sutures.

Sponges.

Gauze dressing.

Bandage.

A curved dropper is used in the end of the tubing instead of a needle.

A local anesthetic may or may not be used. When the condition warrants such a procedure, but little pain is felt.

CHAPTER XXII.

THE CARE OF THE EYES AND EARS.

THE CARE OF THE EYES.

As a rule no organ is so universally abused and so poorly cared for as the eye. The knowledge necessary for the intelligent care of the eyes in diseased conditions can only be gained by a special training.

In the general care of the sick it often becomes necessary to wash out the eyes; to put in drops or powder; to apply ointment or compresses, either hot or cold.

The sickest patients, particularly those suffering from various forms of nervous diseases, meningitis, or unconsciousness may lie with eyes open. Particles of dust containing bacteria may fall on them, causing irritation and inflammation. The tears are not diffused over the surface as in normal conditions, the conjunctivæ become dry with possible ulcerations, which are likely to occur over the cornea, this being the most prominent part of the eye.

Such eyes should be washed out frequently with sterile water or boracic acid 2 per cent. Pieces of gauze should be wet and laid over them; this prevents the dust from getting in, and at the same time keeps them moist.

To wash out the eyes, separate the lids with the finger and thumb of one hand, making the pressure necessary to keep them open, on the bony prominences above and below the eye. Direct the stream from the inner angle outward; this is necessary in order to prevent the discharge, if there be one, from getting into the other eye; the eye should be wiped in the same direction. A soft rubber bulb syringe or pieces of absorbent cotton may be used.

FIG. 40

Method of putting drops into the eye.

To put drops into the eye, separate the lids, drawing the under one well downward; this forms a shallow pouch, into which from the *outer angle* the drops should be put, taking care that the dropper does not come in contact with any part of the eye. When using atropine it sometimes becomes necessary to close the tear ducts by gentle pressure at the inner angle, to prevent the drug from passing through the ducts and thence into the throat.

Ointment may be applied with a swab made of an applicator and absorbent cotton. The lids should be separated and the ointment applied on the inside of the under lid; the eye should then be closed and the ointment diffused over the surface by a gentle rotary motion of the finger on the outside of the lid.

Powder may be shaken from a camel's hair brush directly into the eye, which is held open as described above.

THE CARE OF THE EARS.

Neglect of earache often results in serious complications. A discharge accompanied by occasional attacks of dull pain, and a discharge without pain or the sudden onset of acute pain, are important symptoms.

Earache, sudden in its onset and accompanied with a sharp, "crackling" pain upon swallowing, is the result of acute inflammation of the middle ear (otitis media), and may follow or complicate any of the infectious diseases, the infection extending from the throat through the Eustachian tube, or it may be carried by the blood stream.

Neglect of any of these conditions may result in deafness (partial or complete), mastoiditis, meningitis, brain abscess, inflammation of the large bloodvessels, and the formation of clots creating an embolism, or general infection of the blood stream and death.

In acute otitis media or mastoiditis, ice is usually applied to relieve the pain and inflammation. It should be remembered that this must be constant.

The ice-cap should be large enough to cover the entire side of the head, and should be filled only about half full; it should never be allowed to become even slightly warm.

The extreme cold may be borne better if the ice-cap is covered with a flannel cover.

FIG. 41

Ear irrigation.

Aural Douches or Irrigations are used for cleanliness and to reduce inflammation. When used for cleanliness, a mild antiseptic is used, the temperature of which should be about 100° F. When used to reduce inflammation, sterile water or 2 per cent. boracic acid

solution, which should be of a temperature of 110° to 118° F. If the solution is too cold it often causes faintness.

The irrigator should not be high enough to give any amount of force to the stream. Too much force has produced unconsciousness. The stream should not be directed straight into the ear, but against the posterior wall; it will then flow in without causing pain or dizziness.

The auditory canal, which is curved, should be straightened in an adult by lifting the auricle upward and backward; it may be done in a child by pulling it downward and outward.

After an irrigation the canal should be thoroughly wiped out, small twists of absorbent cotton being used to absorb the fluid. Probes, applicators, and forceps should never be used in the ear, as by any sudden movement of the patient he may do himself considerable injury.

CHAPTER XXIII.

INFECTIOUS AND CONTAGIOUS DISEASES.

Modes of Transmission—Immunity.

Disease is any mental, moral, or physical disorder.

Infectious diseases are those caused by entrance into the body of small, living organisms of either plant (bacteria) or animal (protozoa) life. As a rule, the organisms which produce disease are dependent upon other living bodies for existence. The large majority of those that infect man are able to live only a limited period outside the human body.

The transmission of disease in most cases is dependent upon contact either directly with the infected person or with material recently cast off from such an individual.

Contagious diseases are always infectious and differ only in the mode of transmission, which may be by *direct* or *indirect* contact. They may be transmitted by a third person or anything which has come in contact with the infected individual.

In several of the contagious diseases the infectious element has not been discovered—smallpox, scarlet fever, measles, etc. It is possible the infecting agent is contained in the discarded epithelial cells, the excreta, or discharges from the nose and throat.

MEANS OF SPREADING DISEASE.

1. By carriers.
2. By contact (direct and indirect).
3. By infected objects.
4. By insects.
5. By air.
6. By food and drink.

1. **Carriers.**—Carriers are persons carrying in their bodies the bacteria which produce disease, but who show no sign of having the disease. The person frequently has had the disease and produced an immunity to it, so the bacteria do him no harm, but he may infect others. These means of spreading disease are important in diphtheria, typhoid, and gonorrhea.

2. **Contact Infection.**—Contact infection is infection caused by coming in direct contact with a diseased person (actually touching him) or by touching objects or persons who have recently come in contact with him (indirect contact). This is the most common method of spreading disease. The diseases usually contracted in this manner are scarlet fever, diphtheria, measles, typhoid, gonorrhea, and syphilis.

3. **Infected Objects.**—Infected objects, such as clothing, bedding, or furniture, which have been in contact with diseased persons days or weeks may spread disease. Spreading disease by infected objects is important in the spore-forming bacteria, such as tetanus and anthrax. Tuberculosis, scarlet fever, diphtheria, and typhoid may be spread in this manner.

4. **Insects.**—Flies are the most common insects that carry disease in this part of the world, typhoid being

one of the principal ones. Malaria and yellow fever are carried by mosquitoes. Bubonic plague by fleas.

5. **Air.**—Bacteria may become dried and be blown about in the dust, or may be scattered from an infected person by coughing or sneezing. This manner of transmission is not common and is unimportant except in tuberculosis and measles, which are sometimes spread in this way.

6. **Food and Drink.**—Uncooked foods, milk, fresh vegetables, and shell-fish sometimes contain disease-producing bacteria from infected persons or materials with which the foods have come in contact. Milk may spread typhoid, diphtheria, or tonsillitis. Infected water supplies from reservoirs or wells may produce epidemics of disease, especially typhoid, cholera, and dysentery. The most common manner of spreading disease is by carriers and by contact.

Immunity.—All the higher forms of life are susceptible under certain conditions to the invasion of parasites of various forms; also some degree of resistance to this invasion is manifested by all animals and plants. In some instances this resistance or defence is so complete that bacteria and other organisms rarely infect the body under normal conditions. This power of defence is called immunity.

Resistance to certain forms of bacteria is often the natural possession of a race or an individual. The resistance is a natural immunity which depends upon the fact that certain disease-producing organisms find unfavorable conditions for reproduction and growth in one animal or person and suitable conditions in another.

There is also a condition the exact opposite to this, a natural susceptibility. Most children are susceptible to scarlet fever, measles, etc., but later in life acquire a certain degree of immunity by having had the disease (acquired immunity).

Acquired immunity may be active or passive.

Active immunity depends upon the activity of the body cells and their power to produce a certain substance which counteracts the toxin produced by the bacteria and in some instances renders them inert or kills them.

This antitoxic substance is only produced in response to the presence of the organism in the body, and is the direct result of its stimulation.

Active immunity may be acquired in several ways:

By the injection into the body of small amounts of bacteria or other microörganisms.

By the injection of attenuated organisms, or those which have been rendered less virulent by passing through other animals. A familiar example of this is smallpox vaccine.

By the injection of dead organisms.

By the toxin produced by certain of the organisms.

The injection of living bacteria is said to produce a higher degree of immunity than the attenuated or dead microörganisms.

Passive immunity is acquired by the injection of the antitoxin produced in the body of other animals which have been rendered immune by any of the above methods.

Vaccines produce active immunity.

Antitoxins produce passive immuntiy.

GLOSSARY.

Abrasion. A break in the skin or mucous membrane.

Acute Disease. An acute disease is one in which the onset, progress, and termination are rapid.

Adhesion. Growing together of two parts or surfaces.

Anemia. Deficiency in the coloring matter in the blood.

Anesthesia. Condition in which sensation is lost.

Ankylosis. Stiffness of a joint, due to adhesions.

Antiseptic. Preventing the growth of bacteria.

Aphasia. Partial or complete loss of the power of speech.

Aphonia. Loss of voice.

Apoplexy. Sudden paralysis, generally caused by a ruptured bloodvessel in the brain.

Apposition. In contact.

Ascites. An abnormal collection of fluid in the abdominal cavity.

Asepsis. Free from septic matter.

Asphyxia. Suffocation.

Aspiration. Withdrawing fluids from the body by means of an aspirator.

Auscultation. Listening to sounds produced in the body, usually of the heart and lungs.

Autoclave. Instrument for sterilizing by steam under pressure.

Bacilli (sing. Bacillus). An important group of bacteria, being rod-shaped.

Bacteria (sing. Bacterium). Unicellular microscopic, vegetable organisms.

Bacteriology. The study of bacteria.

Benign. Not malignant.

Bistoury. A narrow-bladed knife.

Biliary. Pertaining to bile.

Blood-casts. Abnormal microscopic bodies found in the urine; mould of the tubules of the kidneys formed of blood cells.

Calculus. A stone-like concretion found in the body.

Callous. Hard.

Callus. A new deposit about a fractured bone, formed in the process of repair.

Cannula. A small tube, usually of metal.

Caries. Local death of a bone.

Caustic. A substance which destroys tissue (burning).

Coaptation. The adjustment of the edges of a wound or fractured bone.

Comminution. Breaking into small pieces.

Counter-extension. Opposing traction upon a limb in extension.

Crepitus. Grating of the ends of broken bones.

Delirium. A disordered mental condition with excitement and illusions.

Dementia. Loss of reasoning power.

Desquamation. A peeling off of the skin.

Diagnosis. Recognition of a disease by its signs and symptoms.

Edema. Accumulation of fluid in the cellular tissues.

Embolism. A clot or other obstruction in a bloodvessel.

Excoriation. Abrasion of the skin.

Extension. Traction upon a fractured or dislocated limb.

Exudation. The oozing of fluids

Feces. The discharge from the bowels.

Febrile. Pertaining to fever.

Fixation. Making rigid.

Fomites. Substances capable of absorbing contagion.

Gastritis. Inflammation of the stomach.

Gavage. Forced feeding.

Granulations. New cell growth.

Germicide. An agent which kills germs.

Hemorrhage. The escape of blood from the vessels.

Hemostatic. An agent that arrests hemorrhage.

Hygiene. The science of health.

Idiosyncrasy. Individual peculiarity.

Incubation. The period which intervenes between the implantation of the virus and the development of the disease.

Infection. The process of communicating the germs which produce disease.

Inflammation. Response of living tissue to injury.

Inunction. The act of rubbing in an ointment.

Laceration. Tearing.

Lesion. A morbid change in the function or structure of a tissue from injury or disease.

Lysis. A gradual decline, more especially of a febrile disease.

Medium. That in which anything lives.

Microbe. A microörganism.

Micrococcus. A spherical bacterium.

Microscopic. Not visible to the naked eye.

Necrosis. Death of tissue.

Nephritis. Inflammation of the kidneys.

Neurasthenia. Exhaustion of nerve force.

Occlusion. Sealing or blocking up.

Ophthalmia. Inflammation of the conjunctiva.

Osmosis. Diffusion of fluids through membranes.

Pasteurization. Checking decomposition by heating.

Pathogenic. Disease producing.

Peristalsis. Undulating movements of the intestines.

Prophylaxis. Prevention of disease.

Ptomains. Alkaloids formed during the decomposition of organic matter.

Putrefaction. Organic decomposition.

Reaction. Recuperation or return of power after depression.

Recurrent. Returning at intervals.

Reflex. A term applied to involuntary action produced by indirect nerve stimulus.

Relapse. Recurrence of disease before complete convalescence.

Remittent. Alternately abating and returning.

Resolution. Return of tissues to their normal condition after an inflammatory process.

Retching. Attempts at vomiting.

Septic. Relating to putrefaction.

Serum. The fluid constituent of animal fluid.

Sinus. Cavity or space.

Styptic. An astringent that will check hemorrhage.

Thrombus. A blood-clot in a vessel forming an obstruction.

Torsion. Twisting.

Traction. Drawing or pulling.

Tympanites. Distention of the abdomen, due to gas or air in the intestine or peritoneal cavity.

Ulcer. An open sore.

Urticaria. Hives, or a skin eruption of like nature.

Vascular. Well supplied with bloodvessels.

Vesicle. A blister.

Virus. An animal poison.

Viscid. Glutinous.

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